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Feasibility Study
Asbestos Dump Sites
Morris County, New Jersey

Final Report

Prepared for:

U.S. Environmental Protection Agency

Contract No.: 68-W9-0003

Work Assignment No.: C02077

TES 6

ALLIANCE
Technologies Corporation

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FEASIBILITY STUDY
ASBESTOS DUMP SITES
MORRIS COUNTY, NEW JERSEY

FINAL REPORT

Prepared for

U. S. ENVIRONMENTAL PROTECTION AGENCY
Emergency and Remedial Response Division
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New York, New York 10278

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1.0 INTRODUCTION

The purpose of a Feasibility Study (FS) is to identify and evaluate alternatives for mitigating contamination and controlling the effects of contamination on public health and/or the environment. This report is a consolidated FS that focuses on the New Vernon and White Bridge Road properties which are located within the Millington Asbestos Dump Superfund Site in New Jersey. The New Jersey Asbestos Dump Site consists of four geographically separate subsites. These subsites are: the Millington Site, the Dietzman Tract, New Vernon Road and White Bridge Road. By evaluating remedial solutions selected from the technologies available for site cleanup, a response can be formulated that is technically feasible, protects public health and the environment, is cost-effective, and is consistent with applicable or relevant standards. The U.S. Environmental Protection Agency (EPA) formulated the FS process to properly implement the Comprehensive Environmental Response and Liability Act of 1980 (CERCLA) as amended. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 CFR Part 300) establishes the framework for the FS; Table 1-1 presents a summary of its relevant components. The requirements of the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (U.S. EPA, Interim Final, October 1988), hereinafter referred to as the current guidance, assures feasibility studies are conducted in a manner consistent with the requirements of the NCP as revised March 8, 1990.

1.1 Purpose and Organization of Report

Figure 1-1 presents a summary of the approach used for the FS. Initially, a list of the specific goals for cleanup is compiled. Typically, this list is partially based on the results of a risk assessment-based study of cleanup levels performed for the facility. In 1987, an endangerment assessment was completed for the National Gypsum Company (Gypsum). Later in 1987, EPA contractors reviewed and identified deficiencies in this endangerment assessment. The EPA has continued to research risks and coordinate with the Agency for Toxic Substances and Disease Registry (ATSDR) regarding risks at New Vernon and White Bridge Roads, and a risk assessment has been issued. The risk assessment indicates that the risk of inhalation of airborne asbestos at concentrations detected on both properties exceed the acceptable EPA risk range of 10^{-4} to 10^{-6}. Design of the site remedy is based on the results of the risk assessment. The remedy goals are referred to as remedial response objectives.

After remedial response objectives are developed, general response actions are identified that satisfy the objectives. An initial evaluation is made of the areas and volumes of media to which the general response actions will be applied.

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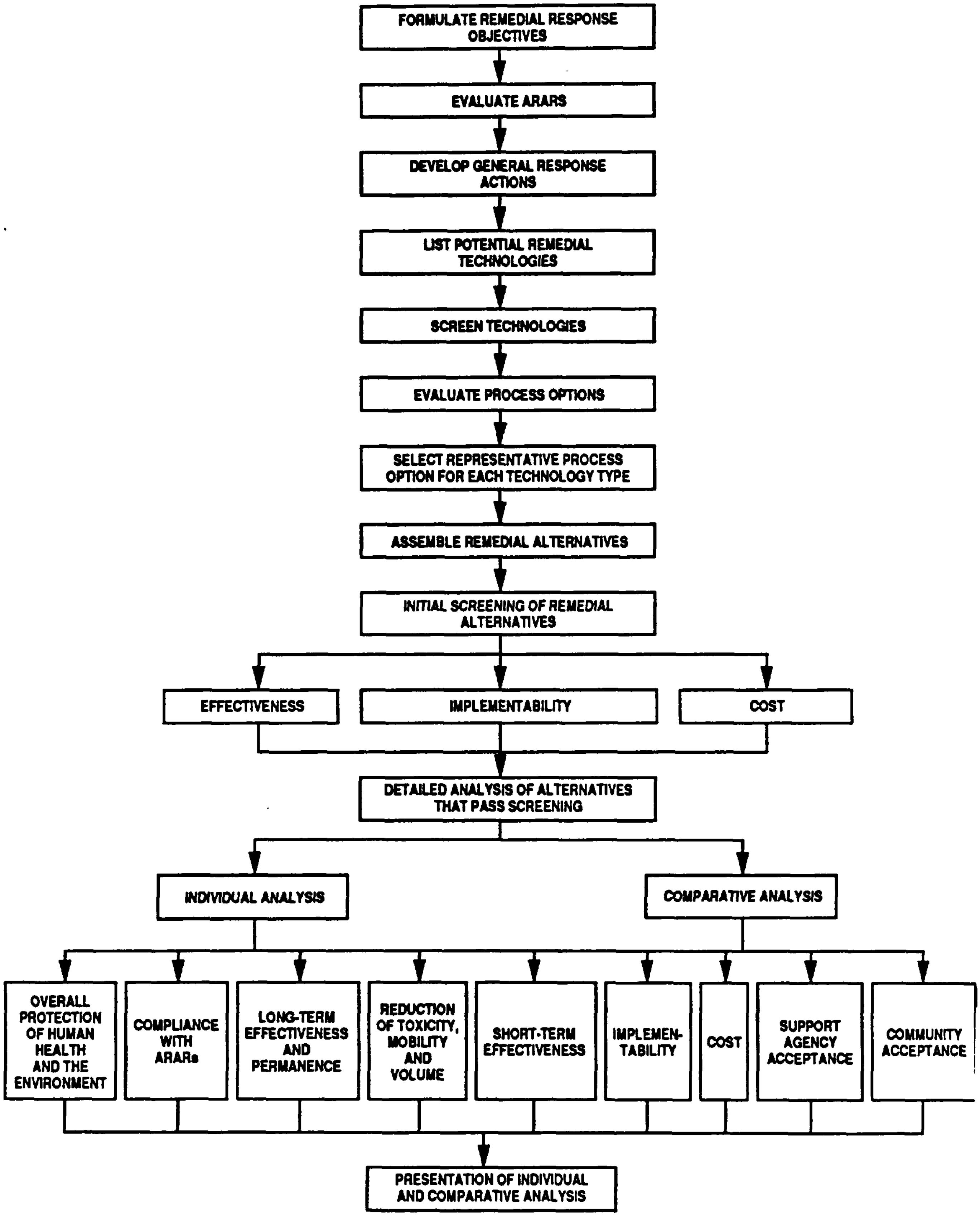

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Figure 1-1. Feasibility study approach.

TABLE 1-1. NCP SUBPART E REQUIREMENTS FOR FEASIBILITY STUDIES AT CERCLA SITES, 40 CFR 300.430

NCP Citation 40 CFR Part	Summary
300.430(e)(1)	The primary objective of the feasibility study (FS) is to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected. The lead agency may develop a feasibility study to address a specific site problem or the entire site. The development and evaluation of alternatives shall reflect the scope and complexity of the remedial action under consideration and the site problems being addressed. Development of alternatives shall be fully integrated with the site characterization activities of the remedial investigation. An alternatives screening step shall be included, when needed, to select a reasonable number of alternatives for detailed analysis.
300.430(e)(2)	Alternatives shall be developed that protect human health and the environment by recycling waste or by eliminating, reducing, and/or controlling risks posed through each pathway by a site. The number and type of alternatives to be analyzed shall be determined at each site, taking into account the scope, characteristics, and complexity of the site problem that is being addressed. In developing and, as appropriate, screening the alternatives, the FS shall:
	(i) Establish remedial action objectives specifying contaminants and media of concern, potential exposure pathways, and remediation goals. Initially, preliminary remediation goals are developed based on readily available information, such as chemical-specific Applicable or Relevant and Appropriate Requirements (ARARs) or other reliable information. Preliminary remediation goals should be modified, as necessary, as more information becomes available during the Remedial Investigation/Feasibility Study (RI/FS). Final remediation goals will be determined when the remedy is selected. Remediation goals shall establish acceptable exposure

(continued)

NCP Citation 40 CFR Part	Summary
	levels that are protective of human health and the environment and shall be developed by considering ARARs, systemic toxicant acceptable exposure levels, known or suspected carcinogen 10^{-4} to 10^{-6} lifetime cancer risk range, technical limitations such as detection/quantification limits for contaminants; factors related to uncertainty; and other pertinent information such as Maximum Contaminant Level Goals (MCLGs), Maximum Contaminant Levels (MCLs), multiple contaminant/pathway cumulative risks, alternate concentration limits, and environmental evaluation factors.
300.430(e)(3)	For source control actions, the FS shall develop, as appropriate: (i) A range of alternatives in which treatment that reduces the toxicity, mobility, or volume of the hazardous substances, pollutants, or contaminants is a principal element. As appropriate, this range shall include an alternative that removes or destroys hazardous substances, pollutants, or contaminants to the maximum extent feasible, eliminating or minimizing, to the degree possible, the need for long-term management. The FS also shall develop, as appropriate, other alternatives which, at a minimum, treat the principal threats posed by the site but vary in the degree of treatment employed and the quantities and characteristics of the treatment residuals and untreated waste that must be managed; and (ii) One or more alternatives that involve little or no treatment, but provide protection of human health and the environment primarily by preventing or controlling exposure to hazardous substances, pollutants, or contaminants, through engineering controls, for example, containment and, as necessary, institutional controls to protect human health and the environment and to assure continued effectiveness of the response action.

(continued)

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TABLE 1-1. (continued)

NCP Citation 40 CFR Part	Summary
300.430(e)(4)	For ground water response actions, the FS shall develop a limited number of remedial alternatives that attain site-specific remediation levels within different restoration time periods utilizing one or more different technologies.
300.430(e)(5)	The FS shall develop one or more innovative treatment technologies for further consideration if those technologies offer the potential for comparable or superior performance or implementability; fewer or lesser adverse impacts than other available approaches; or lower costs for similar levels of performance than demonstrated treatment technologies.
300.430(e)(6)	The no-action alternative, which may be no further action if some removal or remedial action has already occurred at the site, shall be developed.
300.430(e)(7)	As appropriate, and to the extent sufficient information is available, the short- and long-term aspects of three criteria, effectiveness, implementability, and cost, shall be used to guide the development and screening of remedial alternatives.
300.430(e)(9)	(i) A detailed analysis shall be conducted on the limited number of alternatives that represent viable approaches to remedial action after evaluation in the screening stage. The FS must identify ARARs related to specific actions, as well as other pertinent advisories, criteria, or guidance. (ii) The detailed analysis consists of an assessment of individual alternatives against each of nine evaluation criteria and a comparative analysis that focuses upon the relative performance of each alternative against those criteria. (iii) *Nine criteria for evaluation*. The analysis of alternatives under review shall reflect the scope and complexity of site problems and alternatives being evaluated and consider the relative significance of the factors within each criteria. The nine evaluation criteria are:

(continued)

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TABLE 1-1. (continued)

NCP Citation 40 CFR Part	Summary
	A. *Overall protection of human health and the environment.* B. *Compliance with ARARs.* C. *Long-term effectiveness and permanence.* D. *Reduction of toxicity, mobility, or volume through treatment.* E. *Short-term effectiveness.* F. *Implementability.* G. *Cost.* H. *State Acceptance.* I. *Community Acceptance.*

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A list of potential remedial technologies is then compiled. Typically, the list is organized according to the type of contaminated media that must be addressed (e.g., asbestos containing waste and soils, in the case of the properties). This study focuses only on waste and asbestos contaminated soils (collectively referred to as asbestos containing materials or ACM throughout the report), which are addressed together.

Some low level contamination by organic chemicals has been found at the New Vernon and White Bridge Roads subsites. The quality of the data which indicates contamination is suspect and the low levels indicated are not thought to be of concern. These assumptions will be evaluated as part of the remedial activities.

To reduce the list of potential remedial technologies to a useable number of technologies, a screening procedure which conforms to the procedures and criteria specified in the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (U.S. EPA, 1988(A)) is then implemented. The screening eliminates technologies on the basis of technical implementability. Specific site characteristics or waste characteristics typically limit the applicability of technologies and are considered in the screening process.

For those technologies that pass the screening, the associated process options are evaluated in greater detail to allow the selection of one process option to represent each technology type. The representative process option provides a basis for developing performance specifications while evaluating that technology type; although, the specific process actually used to implement the remedial action may not be selected until the remedial design phase. To select a representative process, each process option is evaluated on the basis of effectiveness, implementability and cost, with the greatest focus on effectiveness factors. Innovative technologies are either carried through the screening as a selected process option (if there is a reasonable belief that they offer potential for better treatment performance or implementability, fewer or less adverse impacts than other available approaches, or lower costs than demonstrated technologies) or are "represented" by another process option of the same technology type.

From the technologies which pass the screening process, a reasonable number of distinct and different remedial alternatives or strategies are assembled which address site cleanup to varying degrees. In accordance with the current guidance, alternatives which provide control of the source of contamination should include the following:

- A range of alternatives, from one that would eliminate or minimize the need for long-term management (including monitoring) to several that would use various levels of treatment as their primary component.

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- One or more alternatives that prevent potential exposure and/or reduce contaminant mobility through waste containment with little or no treatment, while still protecting human health and the environment.

- No action alternative.

The current NCP, 40 CFR Part 300.430(e), requires that at least one alternative be developed for each of the following categories.

- A source control alternative in which treatment that reduces the toxicity, mobility, or volume of waste is a principal element.

- A source control maximum treatment alternative that minimizes long-term management of the site.

- A source control alternative that involves little or no treatment, but is protective of human health and the environment.

- If ground water response is necessary, at least two alternatives that attain site-specific remediation levels within different time periods, utilizing different technologies.

- An alternative utilizing an innovative treatment technology, if appropriate.

- No action alternative.

Each assembled alternative is a complete remedial action that addresses each of the operable units or media of concern at a site.

Because alternatives are developed primarily based on medium-specific criteria and implementability considerations, they need to be developed further to consider sizing requirements, specific process characteristics, interactions among media, and overall site impacts. Therefore, alternatives are defined in more detail prior to conducting an initial alternative screening. It is important that alternative definitions offer approximately the same level of detail to allow comparisons to be conducted on an equivalent basis.

1.2 Site Background

The Asbestos Dump Site (the "Site") is a National Priority List Site which includes four separate properties in southeastern Morris County, New Jersey. These four properties include the Millington Site, the Dietzman Tract, the New Vernon Road Site, and the White Bridge Road Site. Currently, the Asbestos Dump project is divided into three operable units. A Record of Decision (ROD) for the first operable unit, the

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Millington Site, was signed on September 30, 1988. Negotiations for implementation of the remedial action were unsuccessful and EPA issued a unilateral order to the potentially responsible party (PRP), National Gypsum Corporation (Gypsum). Gypsum is currently conducting a remedial design for this site. The properties of the second operable unit are the New Vernon Road and White Bridge Road Sites. The Dietzman Tract comprises the third operable unit. This Feasibility Study addresses the New Vernon Road and White Bridge Road properties; the Dietzman Tract is not included in this study.

1.2.1 Property Descriptions

The New Vernon Road property consists of approximately 30 acres of land located at 237 and 257 New Vernon Road in Meyersville, New Jersey (see Figure 1-2). The property is bounded by New Vernon Road to the west, a portion of Great Swamp to the north, and tracts of wooded and wetland areas to the east and south. Two dwellings are on the property, one of these is occupied. In addition, a business is located on the property. One private residence is located directly south of the New Vernon Road property; another residence is located southwest of the property to the south of a tennis club; both of which are located on the opposite side of New Vernon Road.

A driveway recently paved during EPA's 1990 removal action, begins at New Vernon Road to the west of the three-story dwelling located in the northwestern portion of the property. The driveway extends east past the dwelling for approximately 1,000 feet into an open area. This open area, reportedly the main asbestos landfill, is approximately 200 to 300 feet in length and is cluttered with tree debris.

Prior to reaching the open area, a driveway extends north for approximately 200 feet to a tree servicing business. This driveway consists of sand, gravel, asbestos containing material (ACM), and a recently installed geotextile fabric covering. The tree servicing business is owned and operated by the owner of the New Vernon Road property and consists of several large trucks and a two story building. A paved driveway located in the northwest corner of the property provides access to this business.

The White Bridge Road property consists of approximately 12 acres of land at 651 White Bridge Road in Meyersville, New Jersey (see Figure 1-3). This property is bounded by White Bridge Road to the north, the Great Swamp National Wildlife Refuge to the east and southeast, Black Brook to the southwest and a vacant wooded lot to the west. A dwelling and a business are located on the property. Five private residences are located approximately 700 feet north and west of the property.

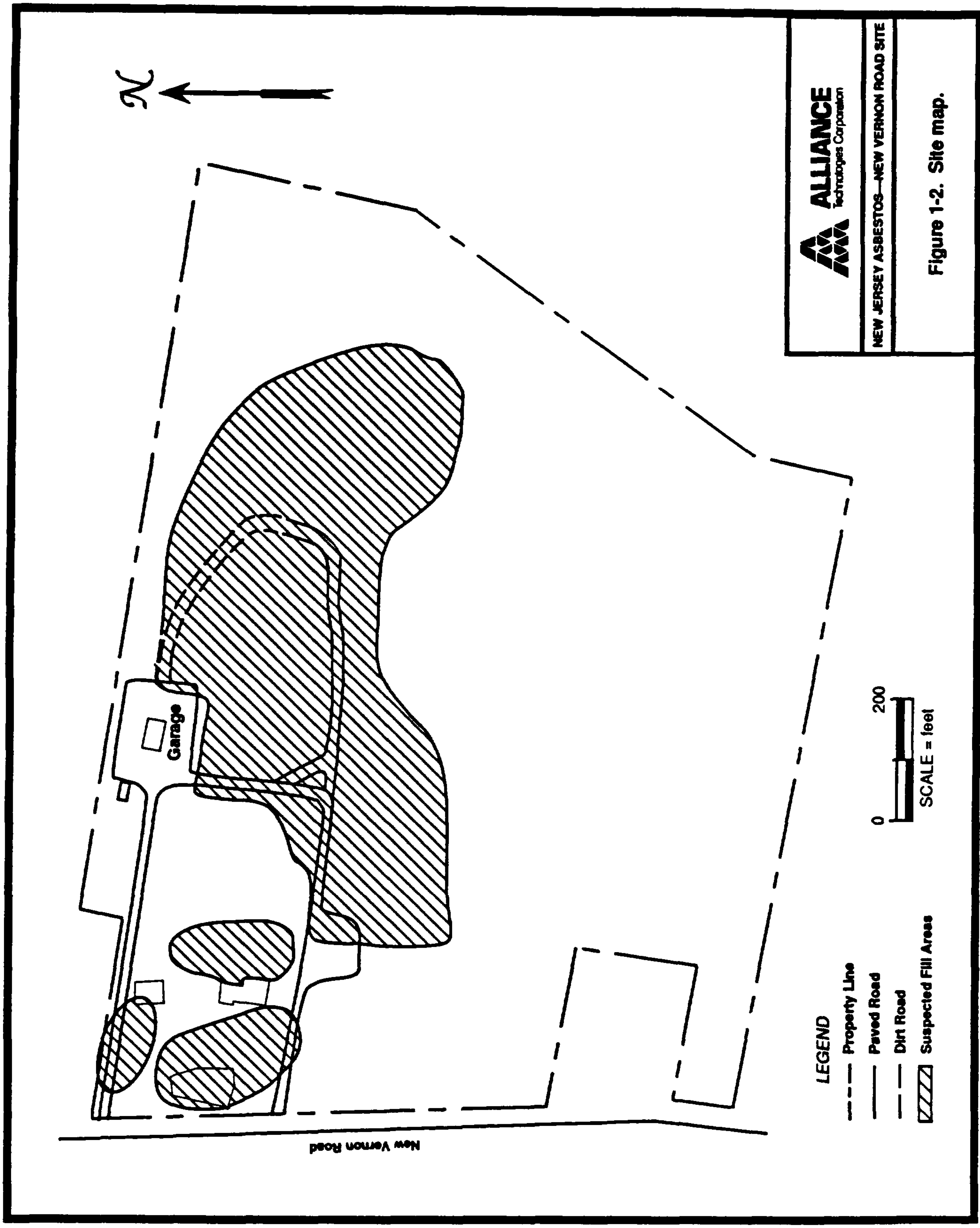

Figure 1-2. Site map.

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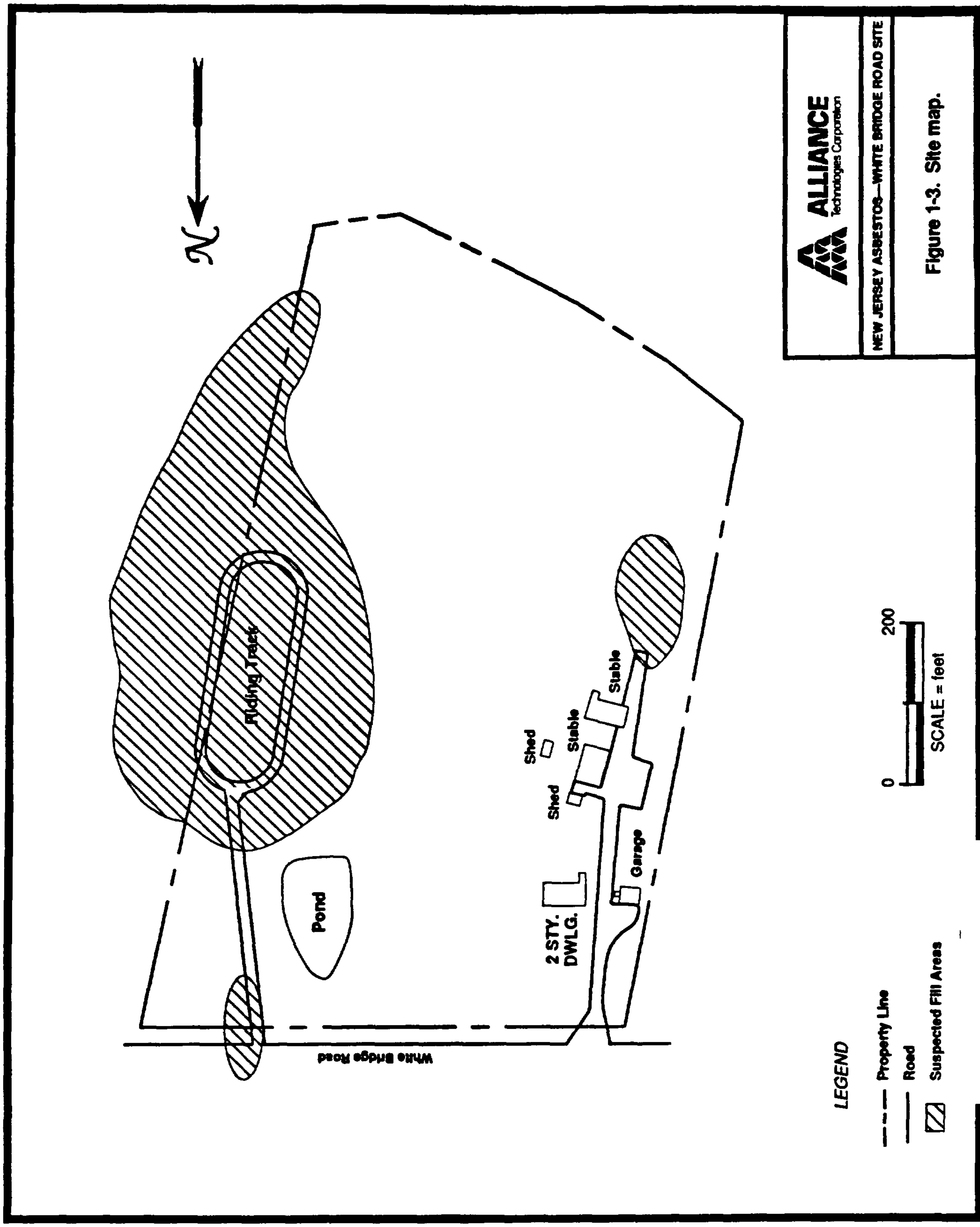

Figure 1-3. Site map.

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An asphalt paved roadway located in the northwest portion of the property maintains access to a two story dwelling, garage, two sheds and three stables. A pond, approximately 100 feet in diameter, is located east of these structures. A horse riding track is situated in the east-central portion of the property and is constructed primarily of ACM. This track is approximately 250 feet long by approximately 125 feet wide and is situated approximately 350 feet from the house and horse stables. A large grazing field is located west of the horse riding track within the central portion of the property. This field is divided into four sections by post and rail fencing and is approximately bounded by the horse riding track, wetlands, the dwelling and the driveway. Trees line the property along White Bridge Road. Large scale site maps of both sites are attached to the back of this report.

1.2.2 Chronology of Events

From 1945 through 1980, the New Vernon Road property was used for farming (e.g., corn and dairy cattle). For a period of two years during the late 1960's, refuse from National Gypsum was disposed of in two areas. Initially, this refuse which included asbestos fibers, broken asbestos tiles, and siding, was disposed of in a small depression in the westernmost section of the property. Land disposal then took place in toward the central portion of the property in a larger depression (i.e., main landfill area).

During 1980, ACM was observed in the various soil and grassy areas throughout the property. Consequently, the property was graded and seeded after being purchased by the current residents.

From 1945 through 1969, the White Bridge Road property was used for farming. From 1970 to 1975, refuse consisting of asbestos tiles and siding from National Gypsum was disposed of on the property. Following the termination of landfilling, the current owner converted the property into a horse farm with stables, a horse riding track, and grazing fields.

1.2.3 Previous Investigations

During 1987, Gypsum contracted Fred C. Hart Associates, Inc. to complete a Remedial Investigation (RI), under EPA supervision, of the Asbestos Disposal Sites, Morris County, New Jersey. Results of this RI are included in Gypsum's RI Report (Draft Report dated May 29, 1987) relevant portions of the data are summarized in Data Compilation Reports on the two properties. Gypsum's RI contained limited information directly relevant to asbestos contamination.

During March and June, 1990, representatives from U.S. EPA's Removal Action Branch (RAB) and Emergency Response Team (ERT), and the U.S. Fish and Wildlife Service conducted site visits to collect information for removal assessment at the property. On August 2, 1990, based on recommendations from ERT representatives, sampling was conducted at the New Vernon Road property. RAB collected surface soil samples from the surface of the driveway and the floor of the shed. A single dust sample was collected from the current owner's vacuum cleaner. On August 24, 1990, ERT collected a dust sample from inside the house located on the property. All samples were analyzed for types of asbestos fibers and percent asbestos. ERT's dust sample was analyzed by both Polarized Light Microscopy (PLM) and Transmission Electron Microscopy (TEM) methods. Sampling results indicated that two to five percent chrysotile asbestos were present throughout the surfaces of the driveway and the shed located on the property.

In August 1990, the ATSDR determined the site posed an immediate and substantial health threat to the residents after TEM (Transmission Electron Microscopy) analyses of eleven soil samples collected form both sites and a dust sample from a resident's vacuum cleaner showed chrysotile asbestos present from 2-5 percent. It was recommended that the residents temporarily relocate until the threat could be remediated, but residents of both sites were not receptive to relocating.

In an attempt to mitigate the immediate health threat; remedial actions were conducted at both sites from September to November 1990. Among the actions taken at the New Vernon Road Site were the paving by asphalt of the gravel drive, removal and containment of a shed containing a fragmented asbestos floor, decontamination of the house, apartment and garage by HEPA vacuuming and wet wiping, collection and bagging of asbestos chips located at surface of primary lawn area, covering of a dirt floor and road containing asbestos tiles with geotextile fabric and the erection of signs and a temporary fence to restrict access into ares suspected of large amounts of surficial contamination. At the White Bridge Road site signs and a temporary fence were also erected to restrict access into areas suspected of surficial contamination and the riding track area and dirt roads were covered with geotextile fabric.

On October 12, 1990, EPA completed an inspection of the interior of the dwelling at 237 New Vernon Road located on the New Vernon Road property. The inspection was completed by state-certified Safety Inspector and an EPA Asbestos Inspection and Management Planner. This inspection, which was limited to one-half of the house currently rented by a tenant, included the collection of three samples that were analyzed for percent asbestos. Sampling results indicated that no ACM was present in that portion of the house located on the property.

During October and November, 1990, EPA's contractor, Alliance Technologies Corporation, conducted a field investigation at the New Vernon Road and White Bridge Road properties. This investigation consisted of several tasks including: a site survey, a geophysical investigation (i.e., ground penetrating radar [GPR]), and soil/ACM sampling, air sampling, and subsequent analyses by PLM and TEM. Results of this investigation are summarized in EPA's Field Sampling and Analysis Reports (Alliance, Final Field Sampling and Analysis Reports, May 1991). Based on the results of this investigative effort, EPA estimated a total of approximately 15,760 cubic yards of ACM to be present in surface and subsurface soils at the New Vernon Road property and a total of approximately 21,320 cubic yards of ACM to be present at the White Bridge Road property.

1.2.4 Nature and Extent of Contamination

The determination of the nature and extent of asbestos contamination at the New Vernon Road and White Bridge Road properties is based on the analysis of samples taken from the surface, subsurface, ground water, surface water, sediment and air samples. This information was obtained from the following documents:

- Final Report, Field Sampling and Analysis at the New Vernon Road Site, Meyersville, New Jersey. Prepared by Alliance Technologies Corporation, May 1990.

- Final Report, Field Sampling and Analysis at the White Bridge Road Site, Meyersville, New Jersey. Prepared by Alliance Technologies Corporation, May 1990.

- Draft Remedial Investigation Report, Asbestos Disposal Sites, Morris County, New Jersey. Prepared by Gypsum, May 1987.

Concentrations of volatile organics, base neutrals, phenols, pesticides and metals at the two properties are discussed and evaluated in the RI data compilation report (Alliance, 1991a, 1991b). Conclusions from this document indicated no widespread contamination of any of the above constituents at either of the two properties.

EPA has noted that data quality issues must be considered when the 1987 data is interpreted. These issues were identified in reviewing the National Gypsum RI data quality procedures for consistency with the *EPA Region II CERCLA Quality Assurance Manual, Revision 1 (October 1989).* One issue is the lack of a discussion regarding data validation in the National Gypsum RI. No section in the report specifically states the validation procedures used and, consequently, information regarding data quality is limited. The EPA concludes that analytical data generated during the RI was evaluated, but not validated in accordance with all EPA Region II data validation standard operating procedures. Another issue is that analytical results from rinse, trip and laboratory blanks indicate detectable levels of volatile organics, base neutrals, phenols, and metals, pointing to field contamination. The end result of this field contamination during the National Gypsum RI is that action levels for analyses (defined as levels above which the data would be fully useable) would be significantly higher than the CRQLs (Contractually Required Quantitation Limits). Since many risk-based numerical standards and criteria are below these action levels, the elevated action levels adversely impact data useability.

At the direction of EPA and based on EPA's Preliminary Risk Determinations in consultation with ATSDR, this FS will only consider the remediation of ACM at the properties. Thus, only the extent of asbestos contamination at the properties are evaluated in this section.

The following subsections describe the concentration levels of asbestos found in each environmental medium at the properties. A summary of the ranges of asbestos concentrations at the properties in the different environmental media is presented in Table 1-2.

Four discrete surface areas have been identified as containing concentrations in excess of the detection limit of 0.5 percent asbestos at the New Vernon Road property. One area is located in the proximity of the structures in the northwestern portion of the property; and two relatively large areas, corresponding to the main landfill area, are located in the north-central portion of the property. Figure 1-2 also presents additional contours indicating surface areas containing ACM at concentrations exceeding one and ten percent asbestos, respectively. Areal extent of ACM was calculated using a planimeter. For the New Vernon Road property, the total estimated area and volume of ACM containing concentrations exceeding 0.5 percent asbestos were approximately 95,130 square feet and 1,760 cubic yards, respectively.

At the White Bridge Road property, three discrete areas containing ACM in surface areas at concentrations exceeding the 0.5 percent asbestos detection limit. These areas have been identified through laboratory analyses (see Figure 1-3). The majority of ACM in surface soils is located in the proximity of the horse riding track in the east-central portion of the property. For the White Bridge Road property, the total estimated area and volume of ACM were approximately 81,450 square feet and 1,150 cubic yards, respectively.

1.2.4.1 Surface Samples

To date, only EPA has conducted surface sampling (0-6") at the New Vernon Road and White Bridge Road property. No surface samples were collected during Gypsum's 1987 RI.

A total of 321 surface samples (188 samples from the New Vernon Road property and 133 samples from White Bridge Road property) were collected and subsequently analyzed. Of these 321 samples, 137 (approximately 43 percent) contained detectable concentrations of chrysotile. Twenty-eight of these samples contained asbestos concentrations above method detection limits. Detection limits were dependent on which laboratory procedure was employed. The majority (approximately 80 percent) were analyzed by transmission electron microscopy (TEM). Where visual inspection

TABLE 1-2. ASBESTOS CONCENTRATIONS ABOVE DETECTABLE LIMITS IN THE SURFACE SOIL, SUBSURFACE SOIL, GROUND WATER, SURFACE WATER, SEDIMENTS AND AIR

Media	Range of Asbestos Concentration New Vernon Road Site	Range of Asbestos Concentration White Bridge Road Site
Surface samples (0-6") (%)	0 - 30.0	0 - 20.0
Subsurface samples (6-96") (%)[a]	0 - 1.05241	0 - 20.0
Ground water (fibers/l)[b]	BDL[c]	BDL
Surface water (fibers/l)[b]	BDL - 3,200,000	BDL - 2,000,000
Sediments (%)	BDL	BDL
Air (fibers/cc)[d]	BDL - 0.063	BDL - 0.012

[a]Only some subsurface soil samples were analyzed by the laboratory. In many subsurface areas ACM was found and was classified visually. Many areas contained elevated levels of asbestos (see Figures 1-3 and 1-4).

[b]Detection limit of 100,000 fibers/l.

[c]BDL - Below detection limit

[d]Detection limit of 0.01 fibers/cc.

of surface samples indicated higher asbestos concentrations, polarized light microscopy (PLM) was utilized. Detection limits for TEM and PLM are 0.5 and one percent, respectively.

The primary difference between the methods used in the analysis of soil samples for asbestos is that the Transmission Electron Microscopy (TEM) method is much more exact and sensitive than the Polarized Light Microscopy (PLM) method. This greater degree of exactness and sensitivity is due to the higher resolution provided by an electron microscope over that of a light microscope. With the resolution offered by the electron microscope utilized in the TEM method, it is possible to identify each fiber present in the sample being analyzed and also determine its length, width and thickness. Based upon the dimensions of each fiber present, their mass is calculated and then, using the total mass of the sample, the percentage of asbestos is calculated. The resolution of the light microscope used in the PLM method is much lower and does not allow the measurement of the dimensions of individual fibers. In order to determine the percentage of asbestos in a sample by the PLM method, it is necessary to "estimate" the percentage of asbestos fibers present in the field of view of the microscope according to the EPA "Interim Method for the Determination of Asbestos in Bulk Insulation Samples", EPA 600/M-4-82-020, December 1982. The PLM method, therefore, does not offer a percentage based on the weights of the fibers present in the sample as does the TEM method. The difference in the degrees of sensitivities provided by each method is reflected in the lower detection limit of 0.5 percent for the TEM method, as opposed to a higher detection limit of 1.0 percent for the PLM method.

The reason that the TEM method is deferred in favor of the PLM method when higher asbestos concentrations are expected is that the grid openings used in the TEM method (as cited in the Federal Register, Volume 52, Number 210) become obscured when higher percentages of asbestos are present, making it difficult to count individual fibers and determine their dimensions. Therefore, when a sample, upon visual inspection, exhibits possible asbestos contamination, the PLM method is the preferred method of determining the percentage of asbestos in the sample.

Since the TEM method is used for the analysis of air samples and presently has no EPA reference for the analysis of bulk solids (PLM is the EPA recommended method for determining the presence of asbestos in bulk samples), samples to be analyzed by this method require a greater amount of preparation than those to be analyzed by the PLM method. The sample preparation and analysis procedure for each method can be found in the "Final Field Operation Plan: Field Sampling and Analysis at the Asbestos Dump Site - Passaic, NJ" (Alliance, 1990).

Of the 28 samples which contained asbestos concentrations above method detection limits, nine (approximately three percent) contained asbestos concentrations above ten percent. From this data, areas at the New Vernon Road and White Bridge Road properties containing elevated levels of asbestos were located. Figures 1-4 and 1-5 present the general areas at the two sites that contain surface asbestos concentrations in excess of 0.5, one and ten percent.

1.2.4.2 Subsurface Samples

All subsurface samples collected during Gypsum's 1987 RI were located in the swamp deposits that underlie the asbestos fill. None of these samples were analyzed for asbestos. Results of the soil analyses are presented in the Data Compilation Reports for the two properties (Alliance, 1991a, 1991b).

EPA conducted and analyzed 112 shallow subsurface samples during their field investigation. Of these 112 samples, 83 were collected at a depth of 18 inches, 19 at a depth of 24 inches, three at a depth of 36 inches, four at a depth of 48 inches, two at a depth of 72 inches and one at a depth of 96 inches.

All subsurface samples were analyzed by TEM except for three samples which were analyzed by PLM. Of these 112 samples, 28 (approximately 25 percent) contained detectable concentrations of asbestos. Only four samples contained asbestos concentrations above method detection limits. Levels of asbestos concentrations ranged from zero to approximately 20 percent.

In addition to the chemical analysis performed on the shallow subsurface samples, field identification of probable ACM was performed based on whether the observed material appeared to be native soil or asbestos fill. This identification was straightforward in the field since the asbestos fill material consisted of tiles, shingles and wallboard slurry. This slurry, a semi-solid material which may be less dense than the underlying soil, was encountered in investigations performed by EPA and Gypsum. The nature of this material should be further defined if a capping alternative is selected. In some cases, density variation in subsurface materials can cause less dense, semi-solid materials, to move toward the surface due to buoyant forces. If this is the case at the properties, this may act to reduce cap containment effectiveness. From this visual investigation, locations and thickness of ACM were determined. This information is presented in Figures 1-6 and 1-7 and was used to calculate volumes of ACM, which is presented in Section 2.3 of this report.

In addition, geologic profiles were developed to better qualify and quantify the vertical extent of ACM in the subsurface. The locations of these geologic profiles are presented in Figures 1-6 and 1-7. Vertical profiles at the New Vernon Road property are located along the A to A′, B to B′, C to C′ and D to D′ transects. Vertical profiles at the White Bridge Road property are located along the E to E′, F to F′, G to G′ and H to H′ transects. These vertical profiles are presented in Figures 1-8 through 1-12.

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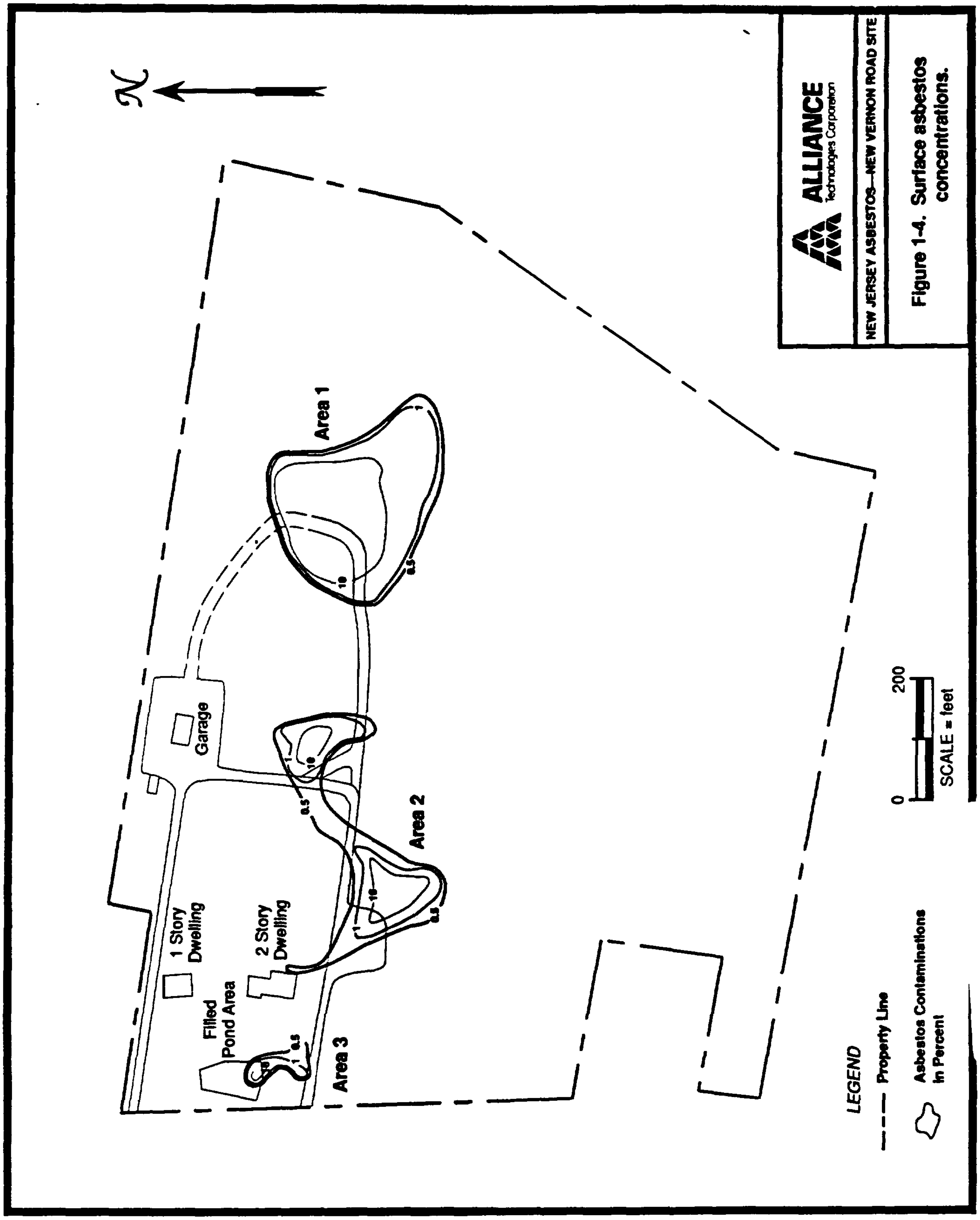

Figure 1-4. Surface asbestos concentrations.

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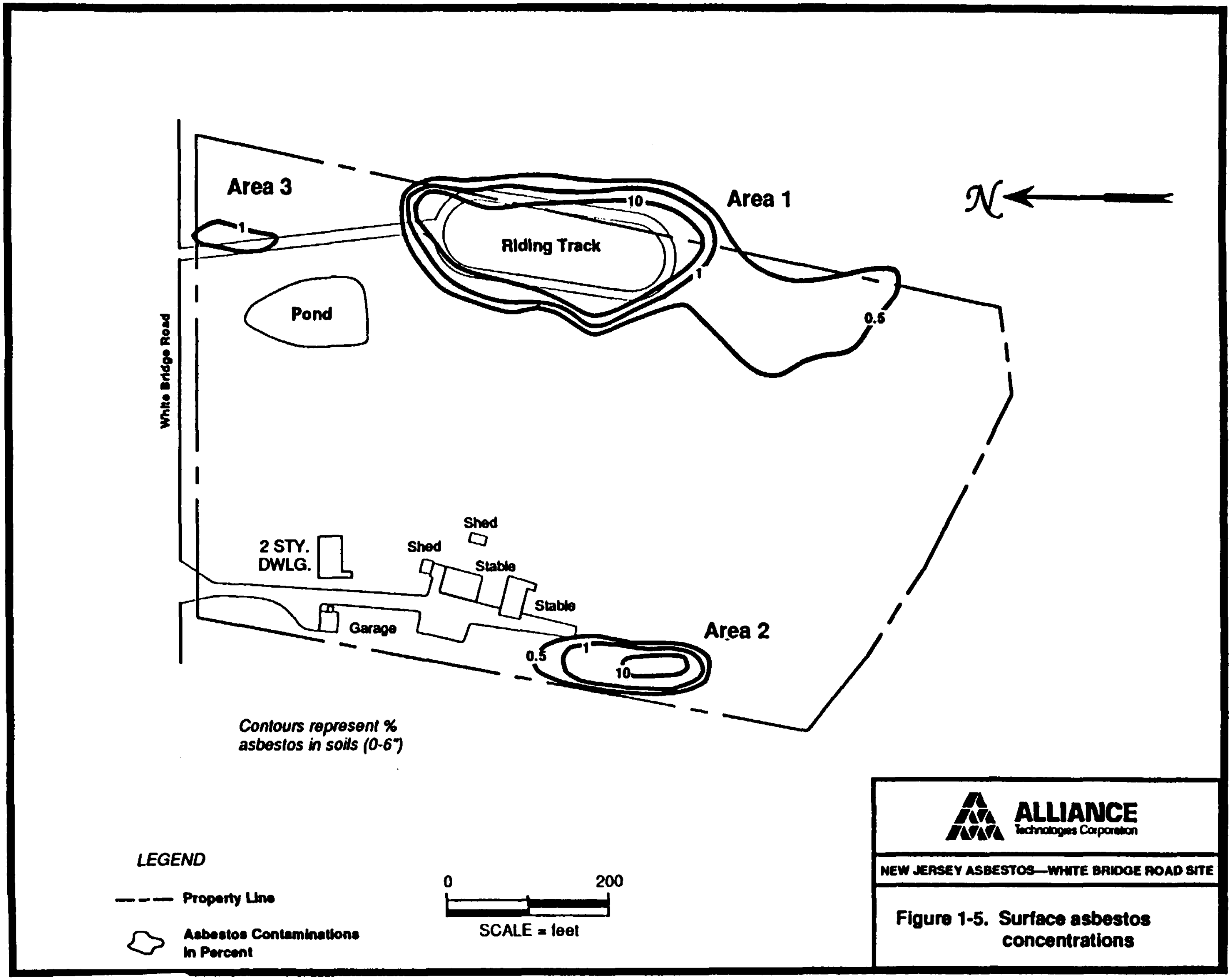
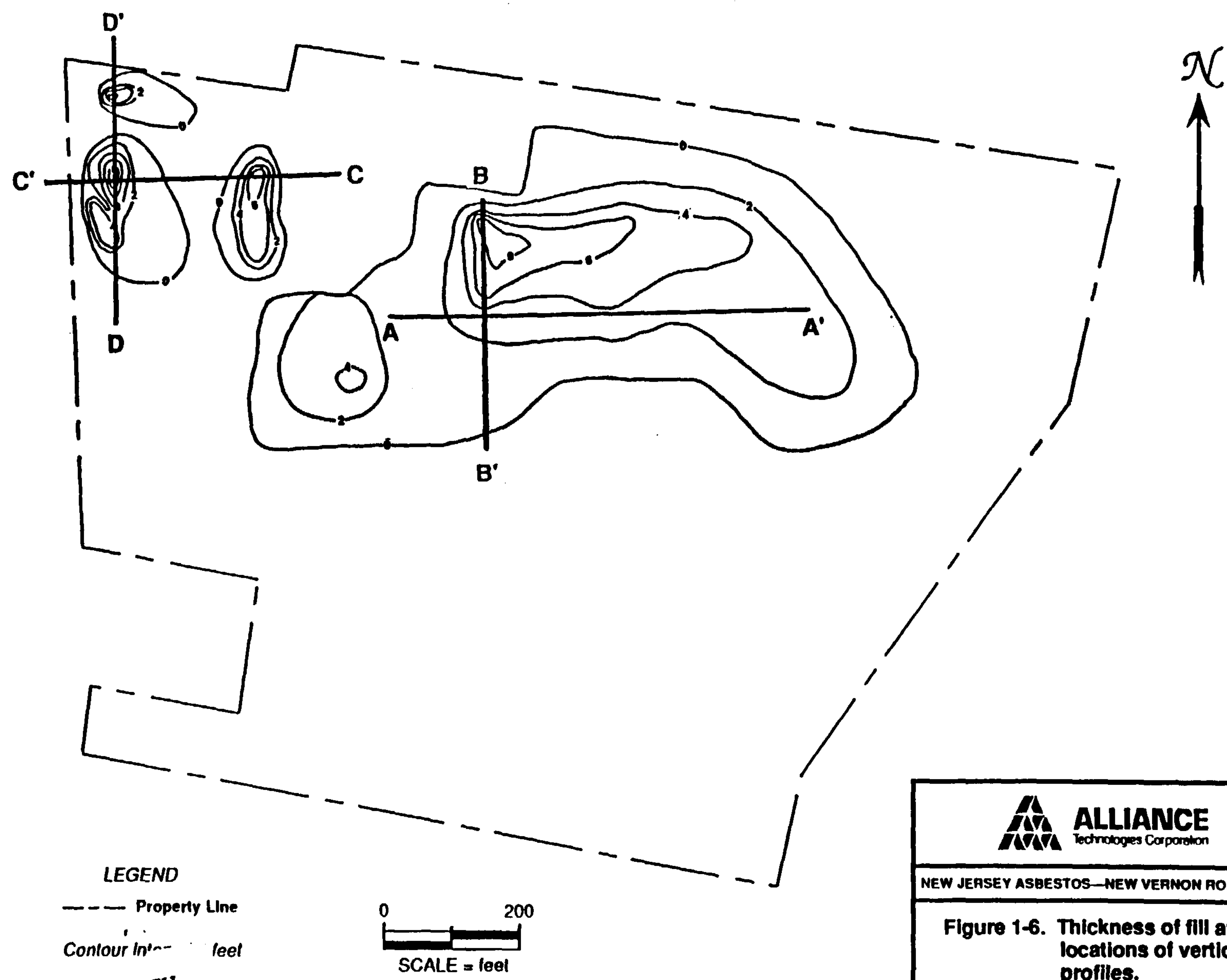


Figure 1-5. Surface asbestos concentrations



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NEW JERSEY ASBESTOS—NEW VERNON ROAD SITE

Figure 1-6. Thickness of fill and locations of vertical profiles.

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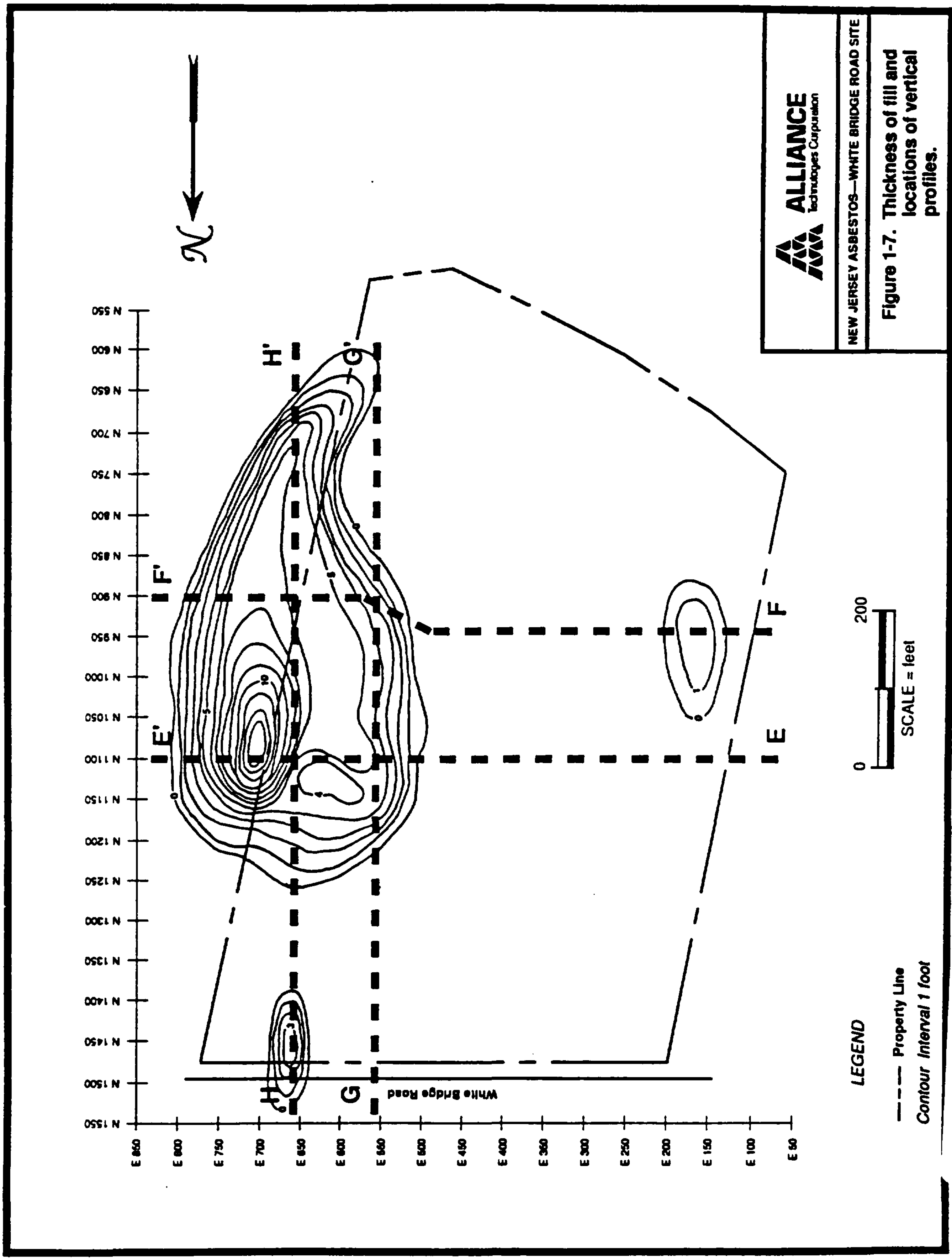

Figure 1-7. Thickness of fill and locations of vertical profiles.

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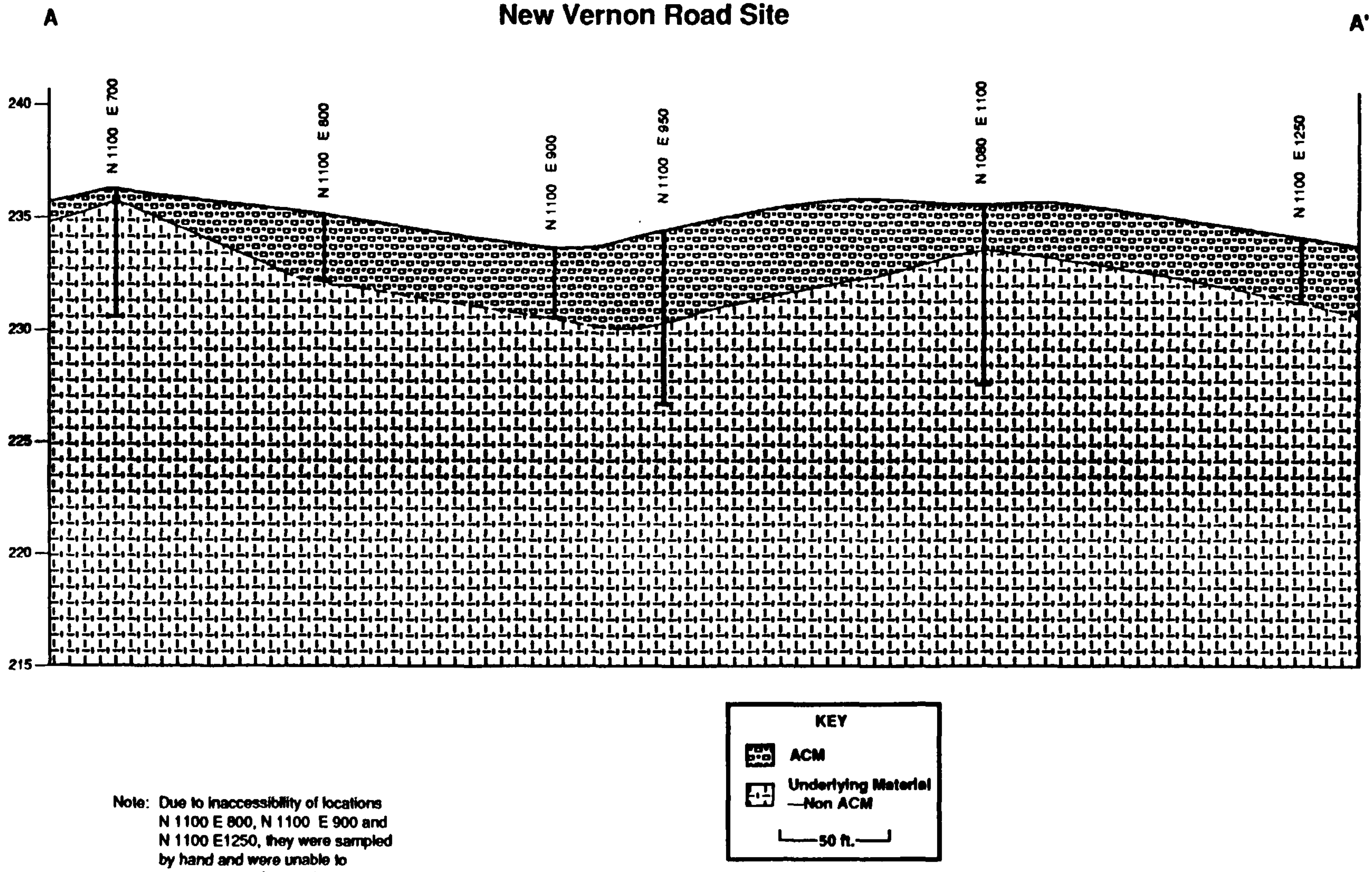
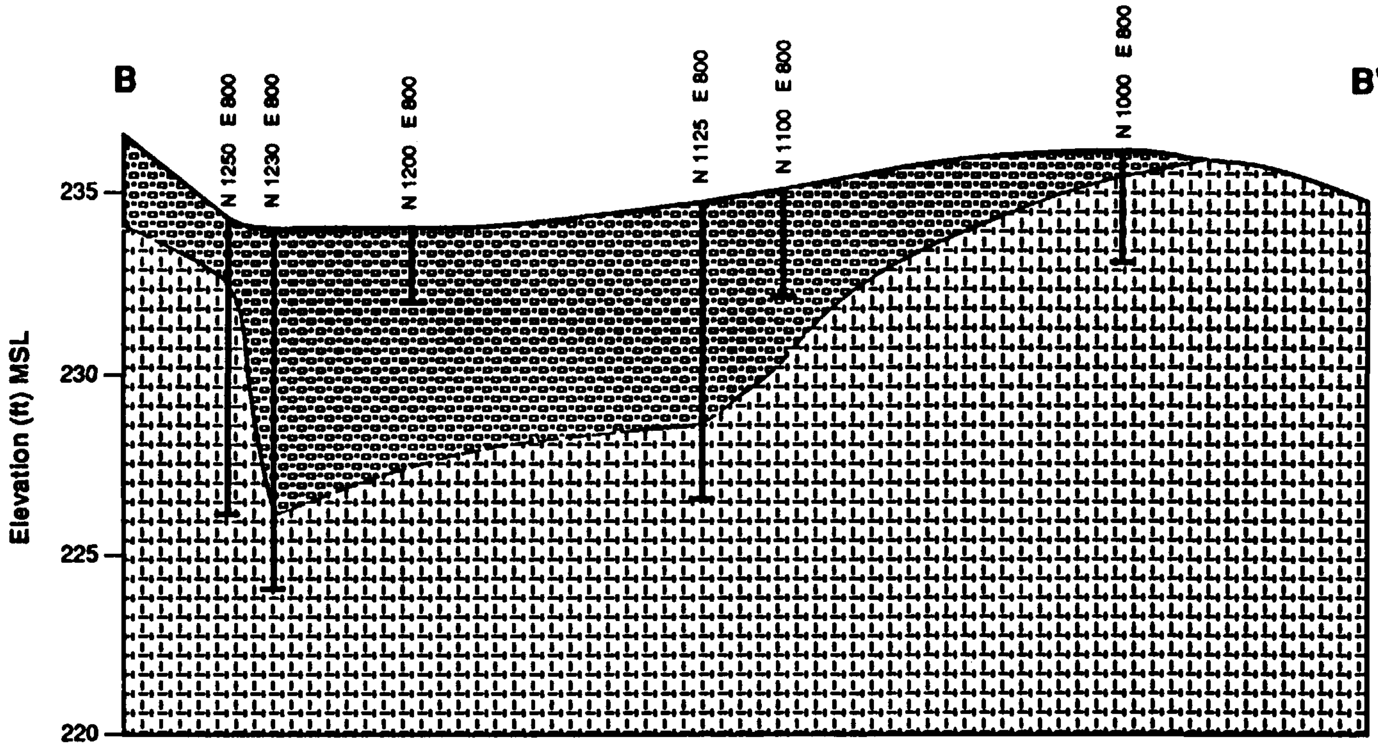


Note: Due to inaccessibility of locations N 1100 E 800, N 1100 E 900 and N 1100 E1250, they were sampled by hand and were unable to penetrate any deeper due to nature of ACM.

Figure 1-8. Geologic profile from A to A'.

New Vernon Road Site



Note: Due to inaccessibility of locations N 1200 E 800 and N 1100 E800 they were sampled by hand and were unable to penetrate any deeper due to nature of ACM.

KEY

- ACM
- Underlying Material —Non ACM

50 ft.

Figure 1-9. Geologic profile from B to B'.

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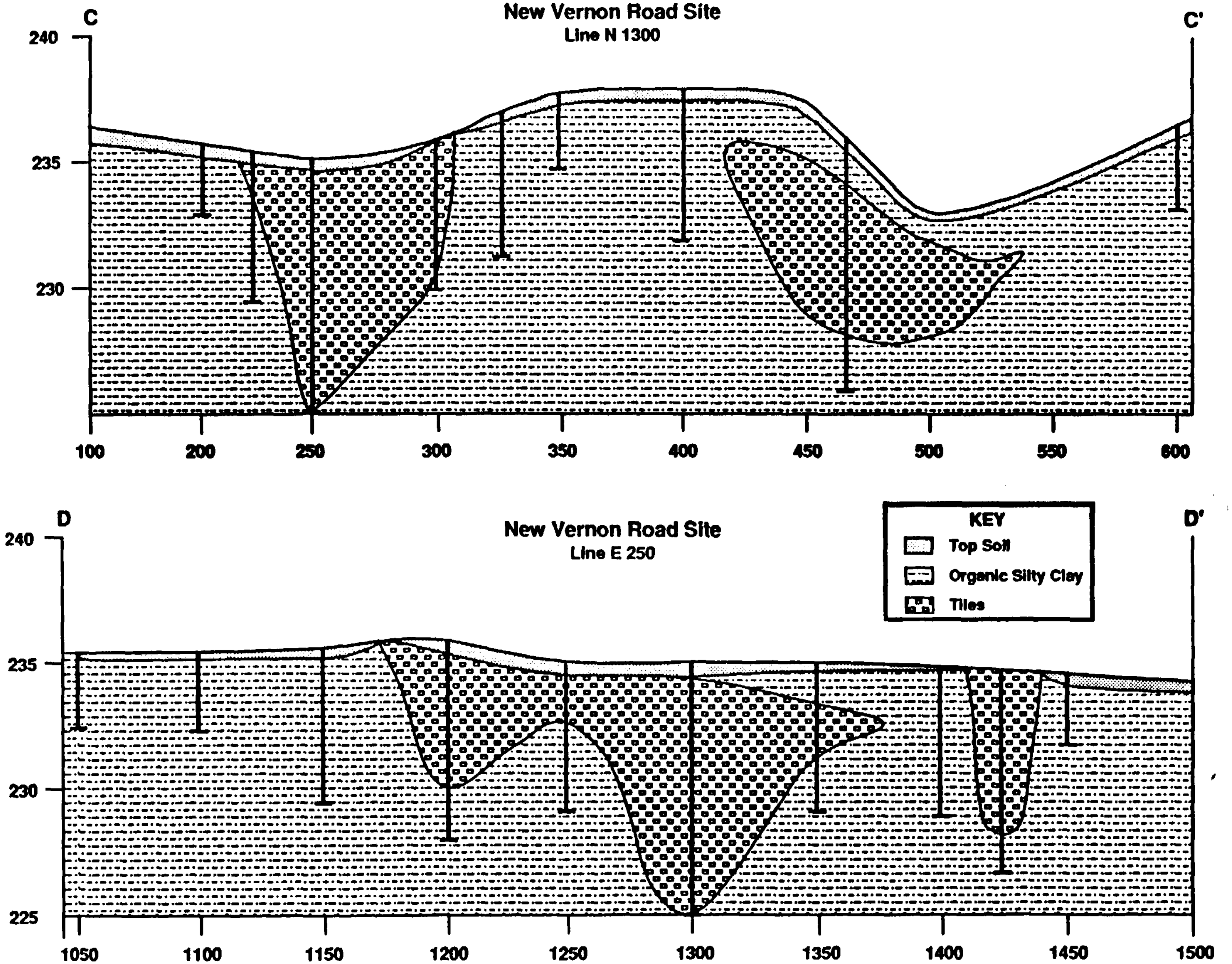

Figure 1-10. Geological cross sections at New Vernon Road.

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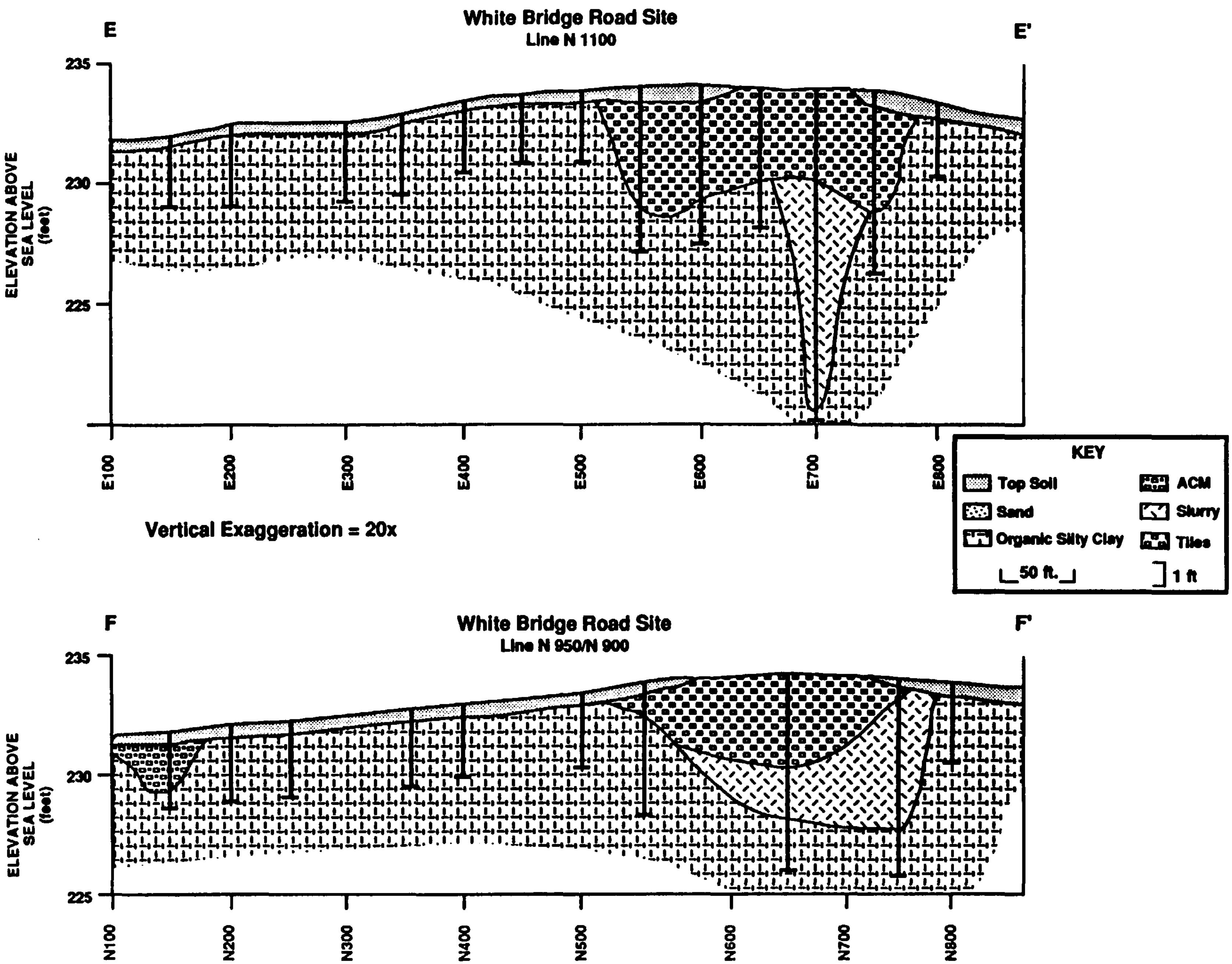

Figure 1-11. East West Cross Sections.

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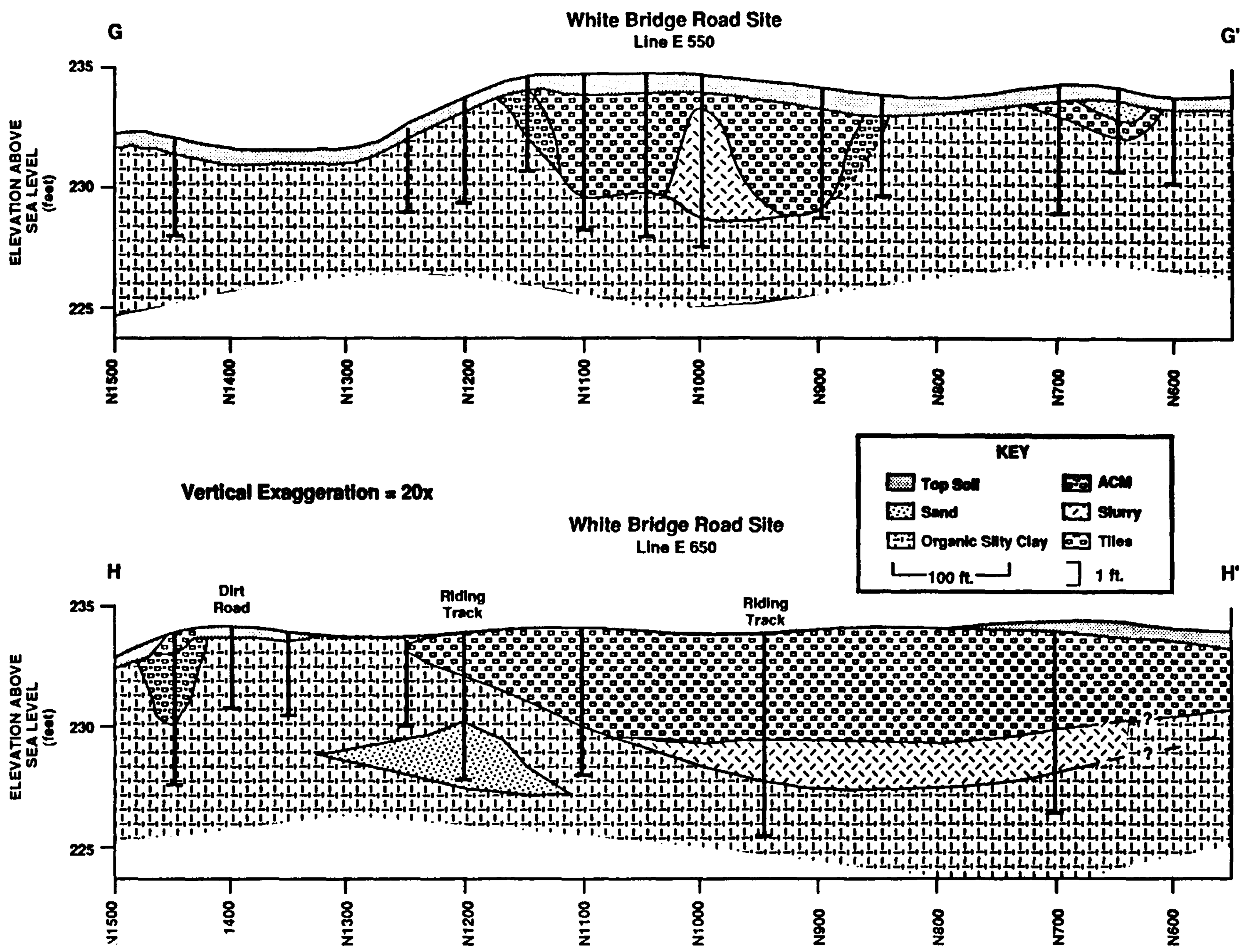

Figure 1-12. North South Cross Sections.

The majority of subsurface ACM at the New Vernon property was found in the north central portion of the property. This area (approximately 28,000 square yards) contained ACM at depths up to eight feet. Three smaller areas of ACM are evident along the access road and in the northwest corner of the property.

The large majority of the subsurface ACM at the White Bridge property was found in the east central portion of the property. This area (approximately 16,000 square yards) contained ACM at depths up to 12 feet. Two smaller areas also exist on the property. One is located along the southwestern boundary and the other is located adjacent to the northeastern boundary, along White Bridge Road.

1.2.4.3 Ground Water

As part of Gypsum's 1987 remedial investigation, three monitoring wells were installed at the New Vernon Road property and three at White Bridge Road property. The monitoring wells were located along the perimeters of the asbestos fill areas (see Figures 1-13 and 1-14). In addition, ground water samples were obtained from potable wells which were located in the vicinity of the two sites (see Figure 1-15 and 1-16).

All ground water samples were analyzed for asbestos contamination. None were found to contain asbestos concentrations above the reported analytical detection limit of 100,000 fibers/liter.

No ground water samples were collected during EPA's 1990 field investigation.

1.2.4.4 Surface Water

As part of Gypsum's 1987 RI, two surface water samples were collected from the New Vernon Road property and three were collected from the White Bridge Road property (see Figures 1-17 and 1-18). Samples obtained at the New Vernon property were collected in drainage ditches (one upgradient and one downgradient of the property). The three samples obtained at the White Bridge Road property were sampled upstream of the property in Black Brook (one sample) and downstream of the property in Black Brook (2 samples).

Some of the surface water samples contained asbestos concentrations above method detection limits. Asbestos concentrations at the New Vernon Road property consisted of below detection limits in the upgradient location (SW-18) and 3,200,000 fibers/liter in the downgradient location (SW-19). Asbestos concentrations at the White Bridge property ranged from 300,000 to 2,000,000 fibers/liter. Asbestos concentrations were 1,000,000 fibers/liter in SW-16 (upgradient of the property) and 2,000,000 and 300,000 fibers/liter at downgradient locations SW-21 and SW-17, respectively.

No surface water samples were collected during EPA's 1990 field investigation.

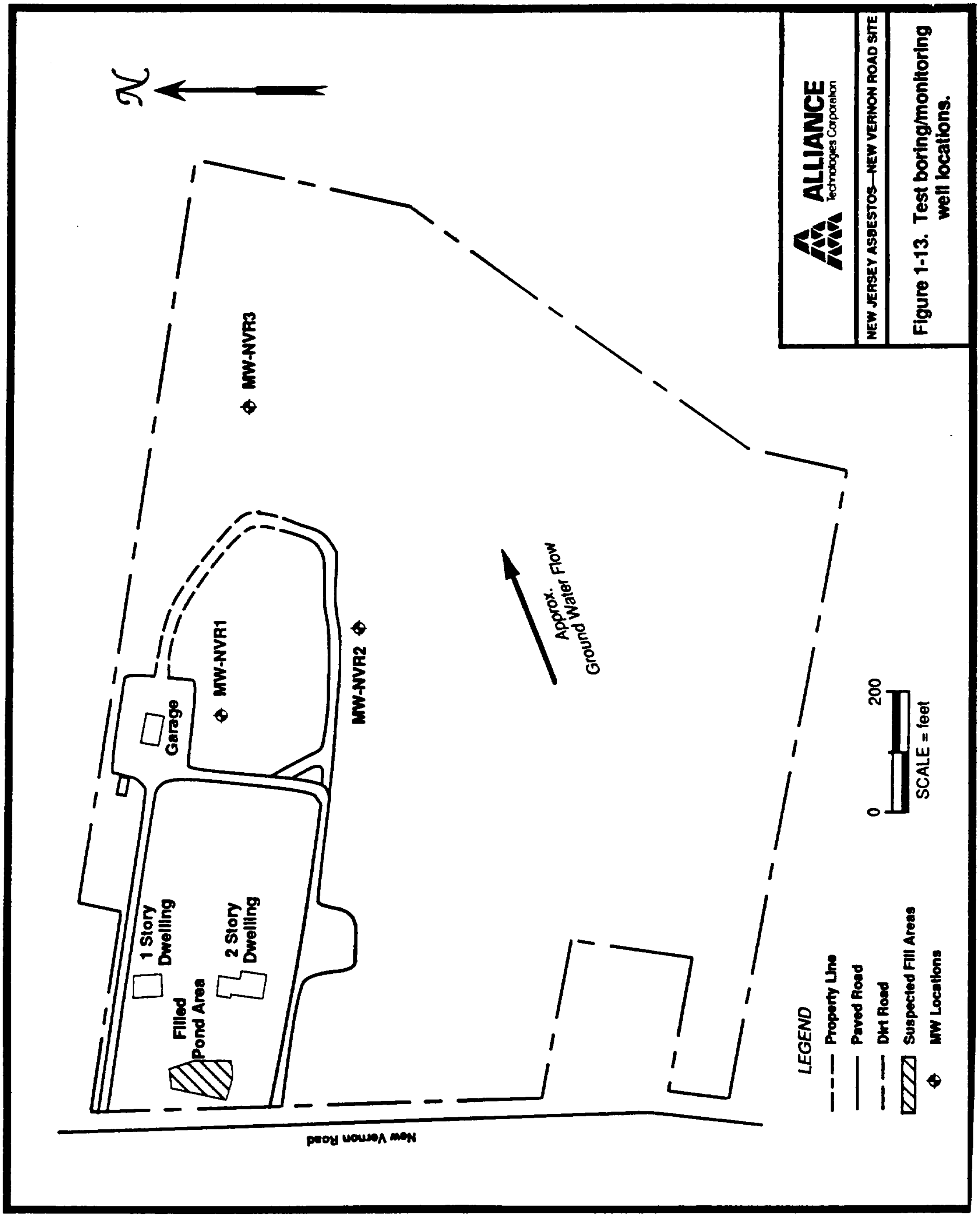

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Figure 1-13. Test boring/monitoring well locations.

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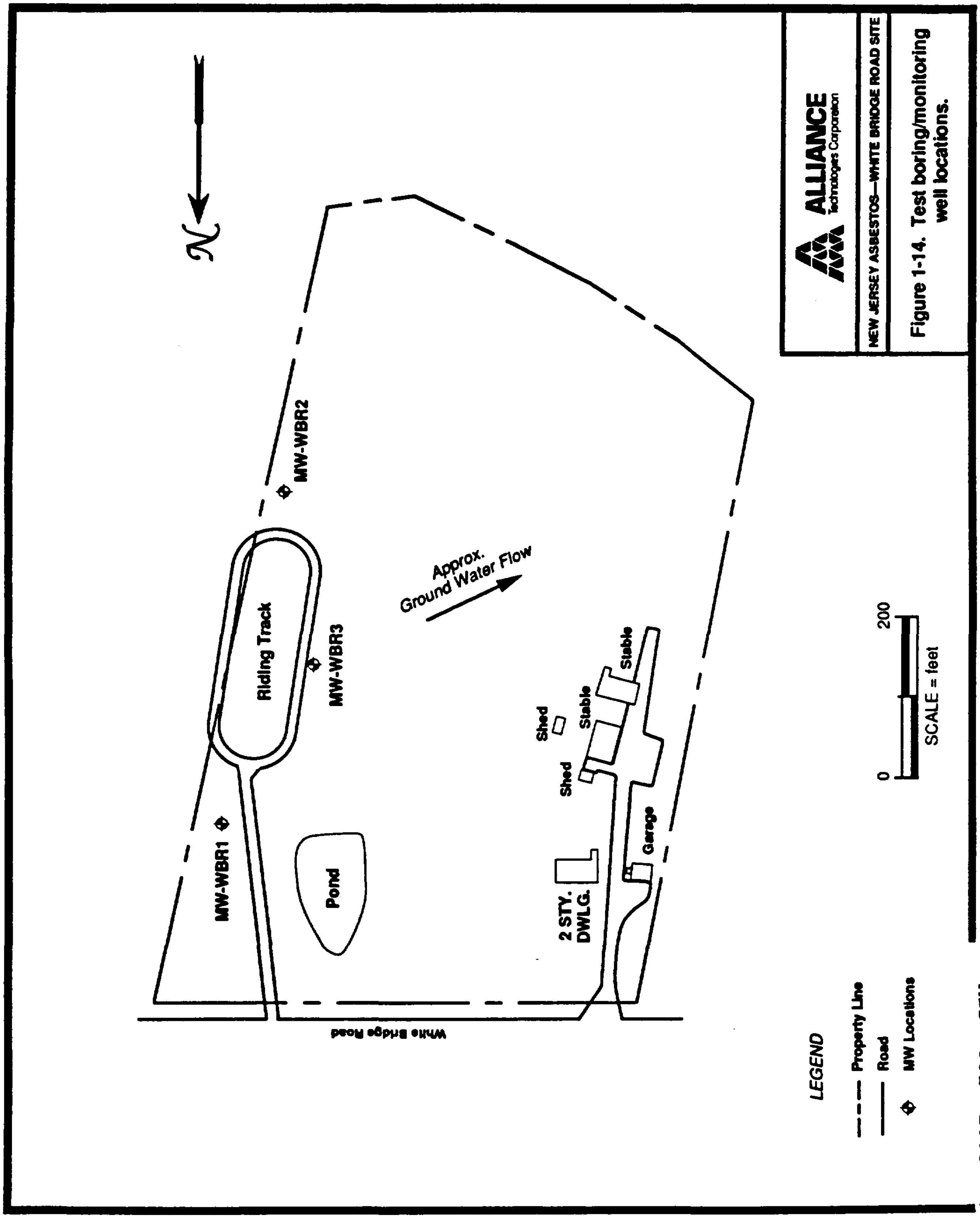

Figure 1-14. Test boring/monitoring well locations.

ABD 001 1605

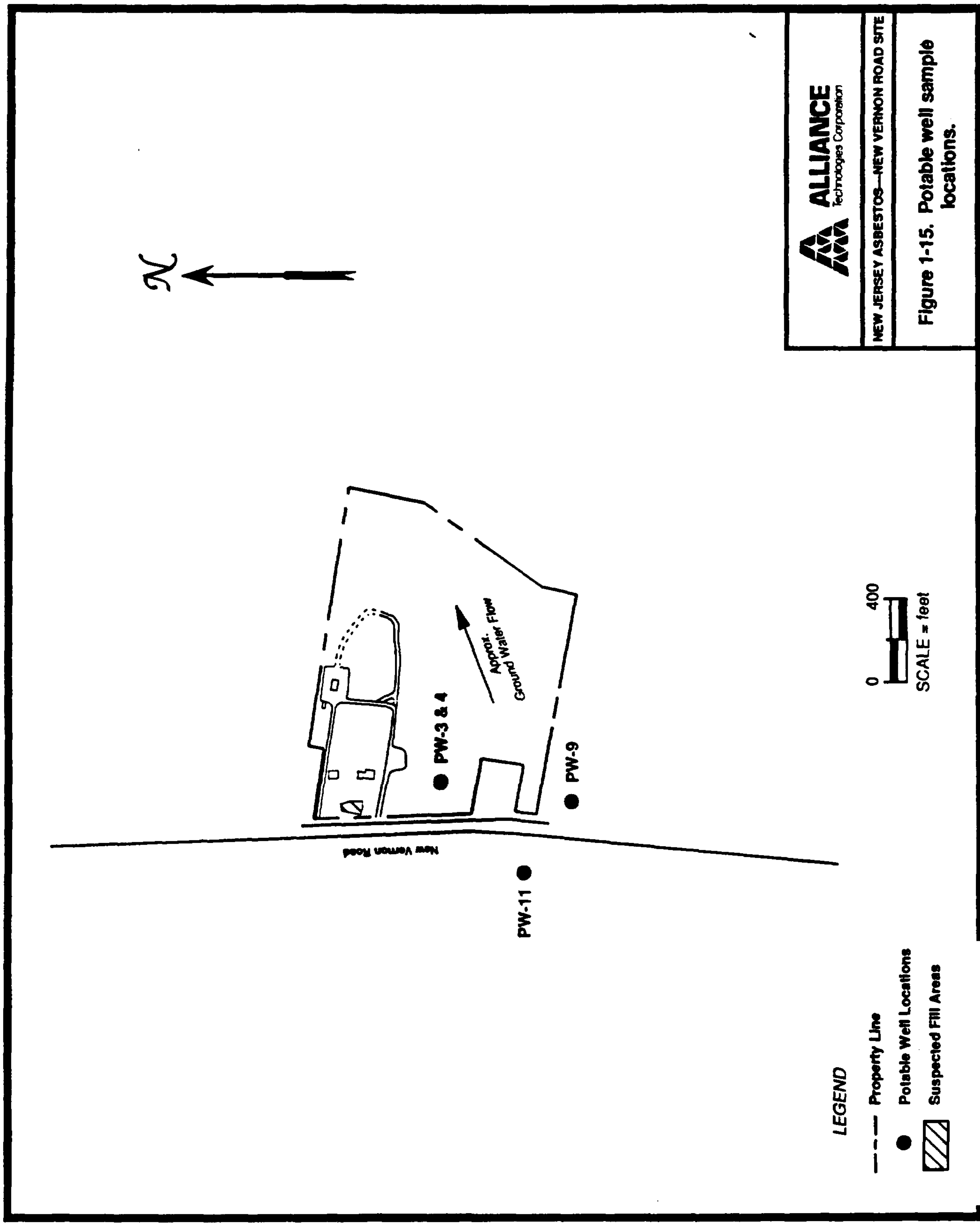

Figure 1-15. Potable well sample locations.

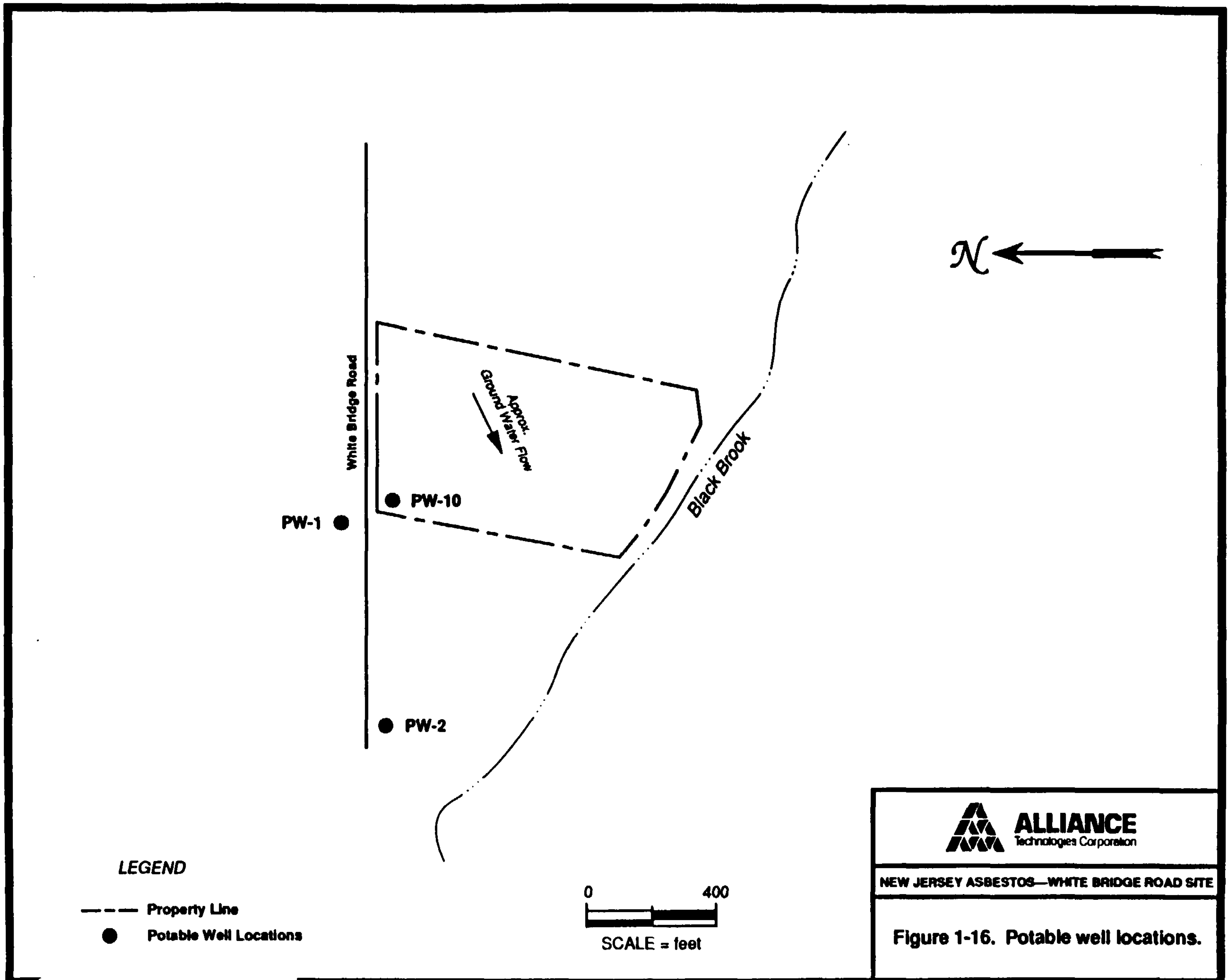

Figure 1-16. Potable well locations.

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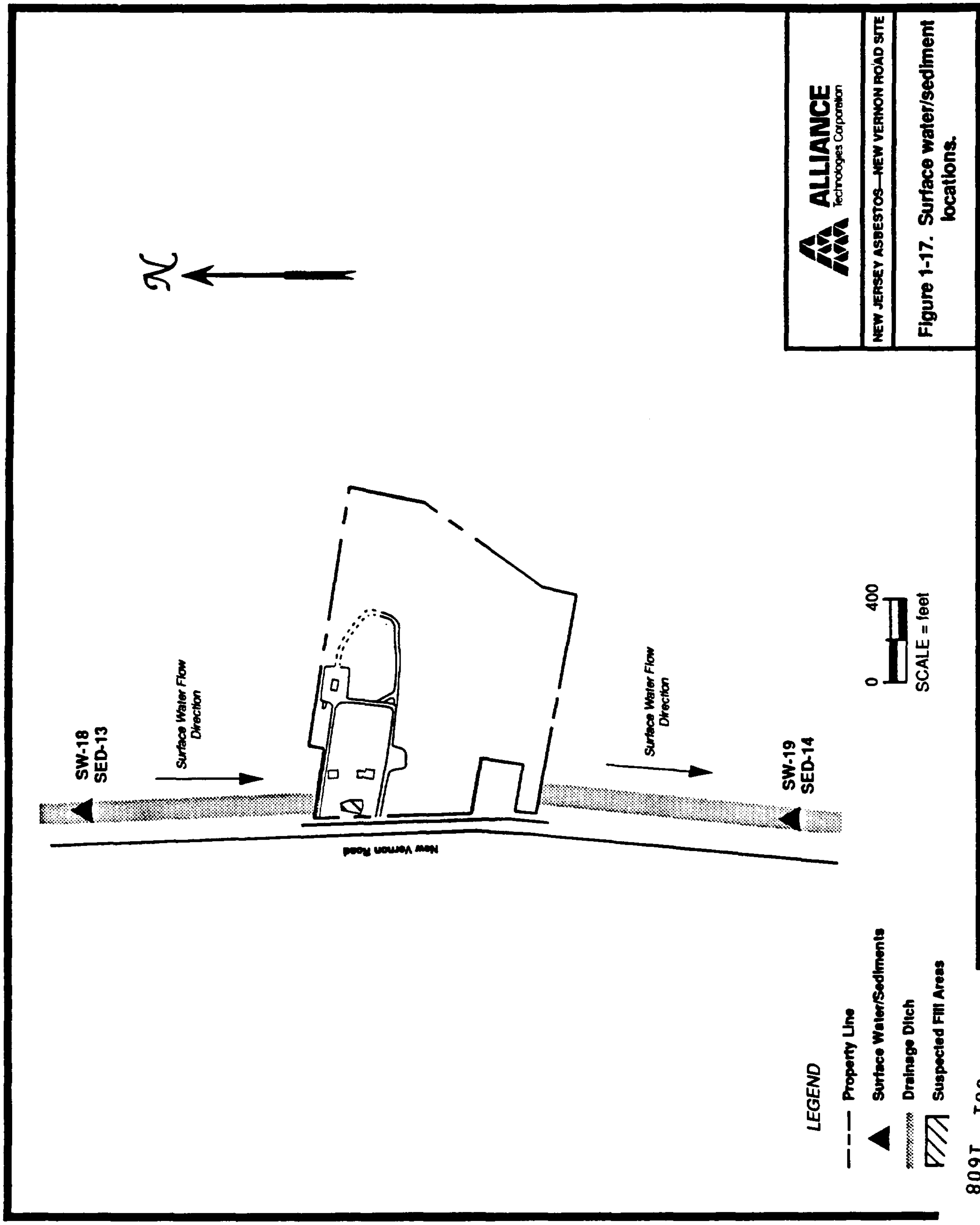

Figure 1-17. Surface water/sediment locations.

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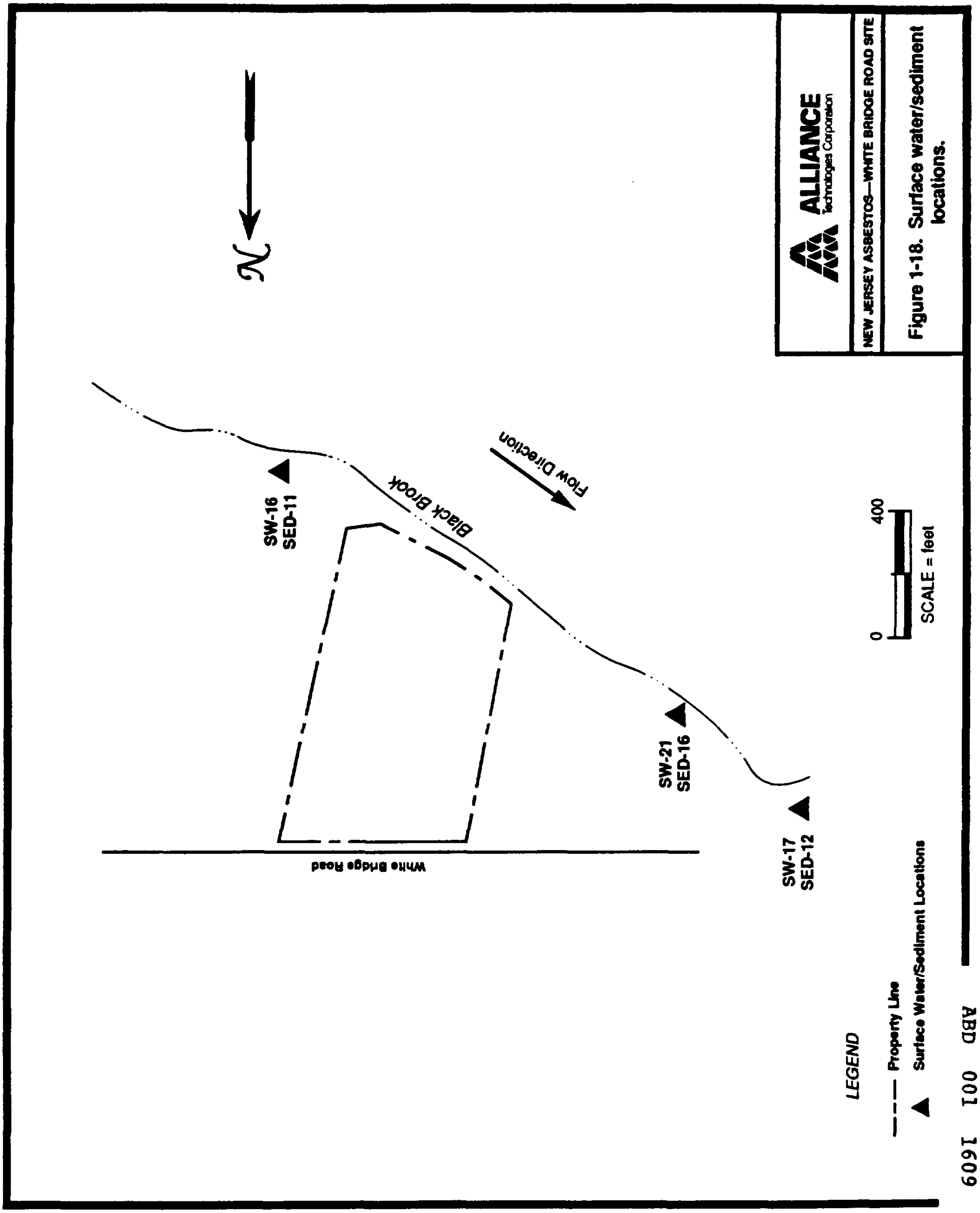

Figure 1-18. Surface water/sediment locations.

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1.2.4.5 Sediments

Five sediment samples were collected near the two properties during the Gypsum 1987 remedial investigation. These samples were collected in the same locations as the surface water samples discussed in Section 1.2.4.4. Sediment sample locations are presented in Figure 1-17.

No asbestos concentrations above method detection limits of 0.5 percent were detected in any of the samples.

No sediment samples were collected during EPA's 1990 field investigation.

1.2.4.6 Air

Ambient air samples were taken and analyzed for asbestos fiber concentrations during Gypsum's 1987 and EPA's 1990 field investigation.

During Gypsum's RI, a total of six samples and two duplicates were collected at the two properties. These samples were collected during drilling activities. The primary objective was to determine if significant amounts of asbestos fibers would be released during any excavation that might be undertaken as a remedial action and to predict the air quality impact at the site boundary.

Results indicate that all air samples at the White Bridge property boundaries contained asbestos concentrations below the method detection limit of 0.01 fibers/cc. At the New Vernon Road property, two samples contained asbestos concentrations below the method detection limit. One sample and its duplicate contained asbestos concentrations of 0.014 and 0.032 fibers/cc, respectively.

A total of 83 air samples were taken during EPA's field investigation activities. Air samples were collected upwind and downwind of specific locations on the properties. Of the 83 samples, 54 samples were collected from the New Vernon Road property and 29 samples were collected from the White Bridge Road property. Air asbestos concentrations ranged from 0 - 0.063 and 0 - 0.012 fibers/cc at the New Vernon Road and White Bridge Road property, respectively.

1.2.5 Contaminant Fate and Transport

This section presents currently available and relevant media specific asbestos contamination results for several properties that constitute the New Jersey Asbestos Dump Superfund site (New Vernon Road, White Bridge Road, Millington, and the Great Swamp properties). Information from all of the properties at the site are presented in this section in order to provide a more complete picture of the distribution of contaminants at the White Bridge and New Vernon Road properties. This approach

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is used when existing media specific information is not sufficient to illustrate the distribution of contamination at White Bridge and New Vernon Road. The results indicate that there is some transport of asbestos away from the waste material. Asbestos contamination at the site has been detected in all sampled media. The primary source of contamination is the asbestos containing waste. In some locations, ACM is exposed at the surface and can act as a source of contamination. This source can then result in airborne emissions of asbestos and transport by erosion and mechanical mixing. These mechanisms can result in contamination of air, surface water and surface soils.

While not the case at the New Vernon Road or White Bridge Road properties, asbestos contamination has been detected in ground water in borings at the nearby Dietzman Tract. Two of the three monitoring wells containing asbestos contamination at this property are located within ACM. Asbestos contamination in ground water has not been reported in the RI for the New Vernon Road or White Bridge Road properties. This may be due to the fact that most of the monitoring wells are not located within the waste at these properties. Since the water table is located within the waste at both the New Vernon Road and White Bridge properties, it is reasonable to suspect that there will be some contamination of ground water located within the ACM. However, based on the results of the RI ground water sampling outside of the subsurface ACM, no sign of asbestos migration in site ground water has been found. In addition, it is expected that asbestos migration in the ground water will be minimal (Fuller, 1977).

Air contamination from asbestos has been detected at several of the properties including New Vernon and White Bridge Roads. Airborne asbestos can act as a secondary source of contamination and result in surface soil contamination as well as wet/dry deposition of asbestos into surface waters. Airborne transport of asbestos is expected to be the most significant route of human exposure to asbestos contamination at the two properties. This is because the ACM is exposed at the surface at both sites. This material presents a continuing emission source for airborne asbestos migration. Emission sources of this type would be expected to produce continuous long term, low level exposure to asbestos.

Some surface water contamination has been detected in fourteen surface water samples collected as part of the RI investigation. The mechanism of transport of the asbestos is unclear since asbestos was detected in air and in surface water runoff. However, it is unlikely that airborne deposition into surface water will produce waterborne concentrations at the level detected. Thus, it is more likely that the surface water contamination is produced by surface water runoff then by airborne deposition.

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1.2.6 Baseline Risk Assessment

ATSDR has reviewed asbestos contamination data and issued a Public Health Advisory on December 20, 1990 which recommends, among other things, dissociation of the affected residents, either on-site or off-site, from exposure to the site related asbestos fibers in indoor air (ATSDR, 1990).

The primary route of site-derived asbestos exposure evaluated was inhalation of airborne asbestos. Residences and businesses are located on both properties and exposures associated with these activities would contribute to the overall risk posed by the site.

The EPA has performed a risk assessment addressing the potential risks posed by inhalation of airborne asbestos at the site (EPA, 1991b). The asbestos levels which were used to calculate the risks were the maximum detected concentrations of airborne asbestos collected during 1990 field investigation activities at White Bridge and New Vernon Road. The results of this assessment indicate that the risks produced are in excess of this acceptable EPA risk range of 10^{-4} to 10^{-6} at each site. The risk assessment was based on airborne asbestos because it is the primary contaminant of concern. Because of this, EPA has focused on remediation of the asbestos contaminated media at this time. The remainder of this Feasibility Study will only consider remediation of the hazard posed by asbestos.

Several evaluations of the health risks posed by the site have been performed. An endangerment assessment has been performed as part of the Remedial Investigations at the site (Hart, 1987). It eliminated asbestos from it's list of indicator chemicals. Thus, no risks for asbestos exposure were evaluated. A critique of the endangerment assessment performed by Labat-Anderson dated July 20, 1987, calculated an airborne concentration of asbestos in the vicinity of the New Vernon Road site. The results of this effort predicted that the residents at the site were receiving exposure to long term low levels of airborne asbestos. The predicted concentrations were commensurate with the occupational limit prescribed by the Occupational Safety and Health Administration for asbestos workers. No numerical values of excess cancer probability was calculated in this document. The Feasibility Study for the Millington property did not quantify the risks associated with inhalation of site derived asbestos.

The ATSDR has reviewed asbestos contamination data and issued a Public Health Advisory which calls for dissociation of the affected residents, either on-site or off-site, from exposure to the site related asbestos fibers in indoor air (ATSDR, 1990).

The primary route of site-derived asbestos exposure appears to be from inhalation of airborne asbestos. This route would be particularly significant at the White Bridge Road property, which has a horse riding track in an area that is heavily contaminated

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with ACM. Residences and/or businesses are located on both properties and exposures associated with these activities would contribute to the overall risk posed by the site.

The EPA has performed a risk assessment addressing the risks of inhalation of airborne asbestos resulting from intrusive investigations at the site (EPA, 1991b). The measurements which were used to calculate the risks were taken as part of the personal protection monitoring performed as part of the EPA's site investigations at White Bridge Road and New Vernon Road as performed by Alliance Technologies Corp. The results of this assessment indicate that the risk predicted is in excess of the acceptable EPA risk range of 10^{-4} to 10^{-6}. The risk assessment was based on asbestos only because no dependable organic contamination data exists at the site. Because of this, EPA has focused on remediation of the asbestos contaminated media at this time.

Due to the fact that the 1987 Remedial Investigation has discovered hazardous organic materials in other media at both properties, additional sampling will be performed to evaluate the level of contamination of organic chemicals at the site. If these results indicate significant chemical concentrations, risks posed by these chemicals will be assessed. Remediation of the ACM may act to reduce risks of exposure to other contaminants at the site. This however, will not be evaluated in this study. Therefore, the remainder of this Feasibility Study will only consider remediation of the hazard posed by asbestos.

2.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

Remedial alternative development requires the assembly of combinations of technologies, and the media to which they would be applied, into alternatives which address contamination on a site-wide basis. Prior to alternative development, the remedial response objectives, the general response actions which will satisfy the objectives, and the potential technologies which are applicable to each general response action must be identified. Technologies and specific technologies' process options are then screened to allow the identification of technologies and representative process options which are combined to form remedial alternatives.

The first step in this process is the screening of remedial technology types. This screening uses information from the RI and other sources regarding the site and contaminant characteristics to screen the technology types. At the start of the screening the entire range of possible remedial technology types are considered. These technology types (e.g. thermal treatment, chemical treatment etc.) are then screened on the basis of technical implementability at the site.

2.1 Introduction

Specific goals have been established for remedial actions at the properties based on the results of the RI and the contaminant of concern. These goals, known as remedial action objectives, will guide the development of a remedial strategy for the properties. Response actions are then developed which describe those actions which will satisfy the remedial action objectives. Remedial alternatives will be formulated for each response action which meet the remedial action objectives.

Remedies will be required to attain the media cleanup standards that will be specified by EPA in the Record of Decision (ROD). The media cleanup standards for a remedy will often play a large role in determining the extent of and technical approaches to the remedy. In some cases, certain technical aspects of the remedy, such as the practical capabilities of remedial technologies, may influence to some degree the media cleanup standards that are established.

2.1.1 Preliminary Identification of Applicable or Relevant and Appropriate Requirements (ARARs)

This section provides a preliminary analysis of Federal and state "applicable" and "relevant and appropriate" requirements (ARARs), and additional criteria To-be-Considered (TBCs) for the New Vernon Road and White Bridge Road properties located in Meyersville, New Jersey.

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Definition of ARARs

Applicable requirements are those clean-up standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations promulgated under Federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site. Relevant and appropriate requirements are those Federal and state requirements that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. To-be-Considered (TBC) material are non-promulgated advisories or guidance issued by Federal or state agencies that, although they are not legally binding, can be used in determining the level of clean-up for the protection of health or the environment (EPA, 1988c).

This determination of ARARs and TBC Criteria for the site was based on a review of: (1) the types, quantities, and extent of contaminants detected at the site; (2) locational considerations of the site; and (3) the types of remedial actions likely to be required to mitigate the public health and environmental threats posed by the release of contaminants from the site. Following this, the universe of Federal and state environmental regulations was examined and all chemical-specific, location-specific, and action-specific ARARs applicable to current or expected future site conditions were identified. Also identified were additional Federal and state criteria and guidance To-be-Considered (TBC) during this remedial response program.

2.1.1.1 Chemical-Specific ARARs/TBCs

Chemical-specific ARARs are usually health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount of concentration of a chemical that may be found in, or discharged to, the ambient environment. If a chemical has more than one such requirement, the more stringent ARAR should be employed (EPA, 1988c).

The determination of chemical-specific ARARs and TBC criteria for a site typically follows an examination of the nature and extent of contamination, potential migration pathways and release mechanisms for site contaminants, the presence of human receptor populations, and the likelihood that exposure to site contaminants will occur.

The RI conducted by Gypsum conducted in 1987 and the follow-up sampling conducted by EPA during 1990, provide most of this basic information. These sampling events included the collection and analyses of surface soil, subsurface soil, ground water, surface water, and sediment samples. Based on current information, the predominant contamination at the properties appears to be contamination of soils and sediments with asbestos.

The properties are currently habitated and include permanent residents consisting of both adults and children; this group and neighboring residents constitute the human receptors at the properties.

EPA's follow-up sampling confirmed surface soil and subsurface soil asbestos contamination at the New Vernon Road property in four discrete areas. EPA estimated a total of approximately 12,800 cubic yards of ACM in the main landfill area in the northeast portion of the property and approximately 3,000 cubic yards associated with three smaller areas located in the vicinity of the dwellings. At the White Bridge Road property, EPA estimated a total 20,600 cubic yards of ACM in the area of the former riding track and approximately 700 cubic yards in two discrete areas in the northeastern and south-central portions of the property. Currently, no promulgated and/or proposed Federal regulations/criteria exist for asbestos contamination in soils.

Based on current information, ground water at the New Vernon Road and White Bridge Road properties is shallow (i.e., approximately two to five and a half feet below grade level [bgl]) and above the bottom of the asbestos fill material (i.e., approximately six feet bgl.). Therefore, ACM deeper than two to five bgl is expected to be saturated with ground water. Although asbestos contamination in the ground water within samples taken outside of the ACM at both sites was below detectable limits (i.e., below 100,000 fibers per liter), the potential for ground water contamination within the source areas exists. The National Primary Drinking Water Regulations (NPDWRs) (40 CFR 141.62 revised by 56 FR 3578, January 30, 1991) promulgated a Maximum Contaminant Level (MCL) for asbestos. This MCL is set at seven million fibers per liter (longer than 10 micrometers) to reduce the potential risk of cancer or other adverse health effects which have been observed in laboratory animals. Drinking water which meets the EPA standard is associated with little to none of this risk and should be considered safe with respect to asbestos. This MCL is considered an ARAR for the properties. Maximum Contaminant Level Goals (MCLGs) are non-enforceable health goals more strict than MCLs. The NPDWRs (40 CFR 141.50 revised by 56 FR 3578, March 6, 1991) also set the asbestos MCLG at the same concentration as the asbestos MCL. For the properties, the MCL and MCLG for asbestos are considered ARARs and TBC criteria, respectively.

For surface waters, Ambient Water Quality Criteria (AWQC) has been promulgated under the Clean Water Act. Asbestos contamination has been detected at the properties in the proximity of Black Brook and New Vernon Road Ditch at concentrations (300,000 - 3,200,000 fibers/l) exceeding EPA AWQC. These criteria are considered TBCs.

Federal Chemical-Specific ARARs/TBCs.

Based on a review of the nature and extent of contamination at the properties, and the receptor populations associated with exposure to potentially contaminated ground water, surface water and soils; the Federal ARARs and TBC criteria, which appear in Table 2-1, have been identified.

New Jersey Chemical-Specific ARARs/TBCs

State requirements that establish cleanup levels for the various site contaminants appear in Table 2-2. Chemical-specific ARARs for ground water remediation include the New Jersey MCLs (NJAC 7:10 1.1-7.3) and the NJ Ground Water Quality Criteria (GWQC) (NJAC 7:9-6). The NJ MCLs have been adopted from the Federal MCLs promulgated under (40 CFR 141.11-.16). The NJ GWQC have been established to preserve the quality of various classes of ground water.

The NJ Clean Water Act includes Surface Water Quality Standards (NJAC 7:9-4) which are ARARs for the site. The NJ Ambient Air Quality Standards (NJAC 7:27-13) set requirements for air emissions, and are also considered ARARs for the properties.

2.1.1.2 Location-Specific ARARs/TBCs

A site's location is a fundamental determinant of its impact on human health and the environment. Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they are in a specific location (EPA, 1988a). Some examples of these unique locations include: floodplains, wetlands, historic places, and sensitive ecosystems or habitats.

Federal Location-Specific ARARs/TBCs

Based on a review of site-specific locational features, it appears that the Federally promulgated location-specific ARARs and TBC criteria designed to protect historic and coastal areas are not potential requirements for the properties. However, Federal requirements for the protection of wetlands, floodplains, riverways, and wildlife species may apply. The potential Federal location-specific ARARs for the properties appear in Table 2-3.

The New Vernon Road and White Bridge Road properties are in the immediate proximity the Great Swamp National Wildlife Refuge. The Black Brook, which drains the Great Swamp, flows west through the southern portion of White Bridge Road property and joins the Passaic River approximately one and one-half miles downstream. Wetlands regulations including, the Executive Order 11990, and Section

TABLE 2-1. PRELIMINARY IDENTIFICATION OF FEDERAL CHEMICAL-SPECIFIC ARARs/TBCs

FEDERAL STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Ground Water --			
Safe Drinking Water Act (40 CFR 141.50-.51)	Max Contaminant Level Goals (MCLGs)	Non-enforceable health goals established at levels resulting in no known or anticipated adverse health effects.	ARAR that address potential asbestos contamination in ground water.
Surface Water --			
Clean Water Act (Section 304)	Ambient Water Quality Criteria (AWQC)	Non-enforceable guidelines established for the protection of human health and/or aquatic organisms.	TBC which will affect the implementability of remedial actions involving effluent discharge to Black Brook and the Passaic River.

TABLE 2-2. PRELIMINARY IDENTIFICATION OF STATE CHEMICAL-SPECIFIC ARARs/TBCs

STATE STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Surface Water --			
NJ Clean Water Act (NJAC 7:9-4)	NJ Surface Water Quality Standards	Establishes water quality standards for various classes of surface water.	Potential ARAR due to potential asbestos contamination in ground water. May affect treatments which discharge to area surface waters.
Air --			
NJ Clean Air Act (NJAC 7:27-13)	NJ Ambient Air Quality Standards	Establishes maximum ambient levels for criteria pollutants (ie. NO2, particulates, SO2, CO, ozone, Pb)	TBC criteria for alternatives using treatments which emit state criteria pollutants.

TABLE 2-3. PRELIMINARY IDENTIFICATION OF FEDERAL LOCATION-SPECIFIC ARARs/TBCs

FEDERAL STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Wetlands --			
Executive Order 11990, (40 CFR 6, Appendix A)	Protection of Wetlands	Regulates activities conducted in a wetland area to minimize the destruction, loss or degredation of the wetlands.	ARAR which addresses the wetland area on the properties and in the proximity of the properties (i.e. Great Swamp).
Clean Water Act, Section 404 (40 CFR 230; 33 CFR 320-330)	Prohibition of Wetland Filling	Prohibits the discharge of dredged or fill material to a wetland without a permit issued by the Corp of Engineers.	ARAR which will affect the implementability of a remedial action which impacts the wetland areas on the properties and in the proximity of the properties (i.e. Great Swamp).
Rivers --			
Wild and Scenic Rivers Act (16 U.S.C. 1271)	Protection of Scenic Rivers	Regulates actions which may have an adverse affect on scenic rivers as specified in Section 1276(a).	ARAR as properties are situated adjacent to riverways.
Fish and Wildlife Coordination Act (40 CFR 6.302)	Protection of Wildlife Habitats	Prevents the modification of a stream or river that affects fish or wildlife.	ARAR as properties are situated adjacent to riverways.
Wildlife --			
Endangered Species Act (16 U.S.C. 1531)	Protection of Endangered Species	Restricts activities in areas inhabited by endangered species.	ARAR which addresses the wetland areas at the properties and in the proximity of both properties (i.e. Great Swamp) which may sustain endangered or threatened wildlife species.

(Continued)

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TABLE 2-3. Continued

FEDERAL STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Wilderness --			
Wilderness Act (16 USC 1131)	Protection of Wilderness	Requires designated wilderness areas be administered such that they remain unimpaired.	ARAR which addresses the wetland area (i.e., Great Swamp) in the proximity of both properties.
Floodplains --			
Executive Order 11988 (40 CFR 6: App. A)	Flood Plains Management	Restriction on types of activities which can be conducted within a floodplain to minimize harm and preserve natural values.	ARAR as properties are situated within the Passaic River Basin floodplain.
Flood Disaster Protection Act of 1973	Disaster Prevention	Regulates development in flood prone areas under FEMA.	ARAR as properties are situated within the Passaic River Basin floodplain.
National Flood Insurance Act of 1968 (24 CFR 1909)	Flood Insurance	Provides flood insurance for disaster relief and establishes flood control methods.	ARAR as properties are situated within the Passaic River Basin floodplain.
Resource Conservation and Recovery Act (4 U.S.C. 6901)	Waste Facility Management	Regulates the design of waste management facilities in a 100 year floodplain.	TBC as properties are situated within the Passaic River Basin floodplain.

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404 of the Clean Water Act will apply to remedial actions that impact the wetlands east and west of the properties. Executive Order 11990 states that lead Federal agencies shall avoid undertaking or providing assistance for new construction located in wetlands unless the head of the agency finds (1) that there is no practicable alternative to such construction, and (2) that the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. In making this finding the heat of the agency may take into account economic, environmental and other pertinent factors.

The term "new construction" includes draining, dredging, channelizing, filing, diking, impounding, and related activities.

The term "wetlands" means those areas that are in-undated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetative of aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

The Endangered Species Act (16 USC 1131) will apply if endangered or threatened wildlife species are known to inhabit the wetlands in the proximity of the properties. For remedial actions affect the Black Brook and the Passaic Rivers, the Wild and Scenic Rivers Act and that Wildlife Coordination Act will also be ARARs which serve to limit the impacts on downstream waterways.

Federal floodplain regulations are ARARs since they may affect the implementation of certain remedial actions at the properties, both of which are within the 100 year floodplain of the Passaic River (Transamerica, 1991). The Executive Order 11988, and the Flood Disaster Protection Act of 1973 both serve to regulate and restrict the types of activities that can be conducted in a floodplain. Executive Order 11988 assures federal activities and programs in floodplains (defined as lowland and reactively flat areas adjoining inland and coastal waters including, at a minimum, that area subject to a one percent or greater chance of flooding in a given year) are conducted with appropriate consideration of flood hazards and floodplain management, and consider measures to minimize potential floodplain adverse impact. The National Flood Insurance Act of 1968 establishes flood control methods and provides for disaster relief. Lastly, RCRA (4 USC 6901) establishes criteria for the design of hazardous waste management facilities within a 100-year floodplain.

New Jersey Location-Specific ARARs/TBCs

The NJ Department of Environmental Protection (NJDEP) has promulgated regulations for the protection of riverways, recreational areas, riparian lands, natural areas, flood-

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prone areas and coastal areas. State location-specific ARARs for the properties appear in Table 2-4. These requirements include those designed for the protection of riverways, floodplains and natural areas.

The NJ Wild and Scenic Rivers System (NJAC 13:8-45) will apply to alternatives that impact the Black Brook and the Passaic River. Furthermore, the NJ Flood Hazard Area Regulations may limit remedial activities (i.e., excavation, etc.) due to the sites' location within a flood-plain. The Riparian Lands Statutes (NJSA 12:3-1) will restrict the use of sand or other materials from a river bank. The Natural Areas Regulations (NJAC 7:2-11) will apply due to the properties' proximity to wetlands (i.e., the Great Swamp).

2.1.1.3 Action-Specific ARARs/TBCs

Current information for the properties suggests that remediation activities need to address wastes and the following potentially contaminated media: soils, ground water, surface water, and air. For actions taken to remediate these media, numerous state and Federal requirements are likely to apply. Of the preliminary source control and management of migration remedial action alternatives outlined in Section 3, the following categories of General Response Actions have been identified: No Action, Institutional Controls, Containment, and Treatment.

Federal Action-Specific ARARs/TBCs

Numerous federally promulgated action-specific ARARs and TBC criteria could affect the implementation of remedial measures. The primary regulatory requirements applicable to the properties appear in Table 2-5. Two types of ARARs appear in Table 2-5, including Administrative requirements, and requirements related to Treatment, Storage and Disposal Actions.

The Executive Order 12316 delegates the authority over remedial actions to Federal agencies. The primary Federal administrative requirements that will then guide remediation are those established under CERCLA and SARA. This results from the placement of the properties on the EPA National Priorities List (NPL). Requirements outlined in the current National Contingency Plan (NCP) (40 CFR 300) represent ARARs for the site. The current NCP incorporates the SARA Title III requirement that alternatives satisfy ARARs, and utilize technologies that will provide a permanent reduction in the toxicity, volume, and the mobility of wastes, to the extent practicable.

The primary ARAR for the New Vernon and White Bridge Road properties is the National Emission Standards for Hazardous Air Pollutants (NESHAPs), which establish standards for manufacturing, milling, fabricating, demolition, renovation, and waste disposal issues covering active and inactive waste disposal sites and asbestos

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TABLE 2-4. PRELIMINARY IDENTIFICATION OF STATE LOCATION-SPECIFIC ARARs/TBCs

	STATE STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Rivers --				
	NJ Wild and Scenic Rivers System (NJSA 13:8-45 et seq)	Regulation of River Activities	Provides classification of river systems and establishes regulations governing river areas and wildlife refuge or similiar areas.	ARAR as properties are situated adjacent to riverways.
	Riparion Lands Statutes (NJSA 12:3-1 et seq)	Regulations for River Banks	Regulates river areas prohibiting removal of sand or other materials from a river bank without a license.	ARAR as properties are situated adjacent to riverways.
Flood Plains --				
	Flood Hazard Area Regulations (NJAC 7:13;2-3)	General Standards and Procedures	Standards and procedures for permitting stream encroachment activities.	ARAR as properties are situated within the Passaic River Basin floodplain.
Natural Areas --				
	Natural Areas System (NJAC 7:2-11)	Natural Area Management	Provides for classification, designation and management of natural areas.	ARAR as properties include and are situated in close proximity to wetlands.

ALLIANCE

TABLE 2-5. PRELIMINARY IDENTIFICATION OF FEDERAL ACTION-SPECIFIC ARARs/TBCs

FEDERAL STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Administrative Requirements --			
CERCLA (Title I Sect. 101, 111)	National Contingency Plan (40 CFR 300)	Establishes funding and provisions for the clean-up of hazardous waste sites.	ARAR from the date that these properties were placed on the National Priorities List.
Superfund Amendments & Reauthorization Act (42 U.S.C. 9601)	Clean-up standards/ Response Action	Treatments must provide permanent reductions in volume, toxicity and mobility of wastes & satisfy ARARs.	ARAR from the date that these properties were placed on the National Priorities List.
Uniform Relocation Assistance & Real Property Aquisition Act	General Relocation Requirements (40 CFR 4.2)	Requirements for relocation payments and assistance.	ARAR for alternatives which create need for temporary/permanent relocation of area residences.
Executive Order 12316 and Coordination with Other Agencies	Executive order	Delegates authority over remedial actions to Federal Agencies.	ARAR from the date that these properties were placed on the National Priorities List.
Clean Air Act - Subpart M (40 CFR 61)	National Emissions Standards for Hazardous Air Pollutants (NESHAPs)	Asbestos NESHAP addresses asbestos waste disposal issues, active and inactive waste disposal sites, and asbestos conversion processes.	ARARs for alternatives involving treatments that impact ambient air.
Occupational Safety and Health Act (29 CFR 1910)	General Industry Standards	Establishes requirement for 40-hour training and medical surveillance of hazardous waste workers.	ARAR for workers and the workplace throughout the implementation of remedial actions.
Occupational Safety and Health Act (29 CFR 1926)	Safety and Health Standards	Regulations specify the type of safety equipment and procedures for site remediation/excavation.	ARAR for workers and the workplace throughout the implementation of remedial actions.
Occupational Safety and Health Act (29 CFR 1904)	Recordkeeping, Reporting and Related Regulations	Outlines recordkeeping and reporting requirements.	ARAR for all contractors/ subcontractors involved in remediation.

(Continued)

TABLE 2-5. Continued

FEDERAL STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Administrative Requirements --			
Resource Conservation and Recovery Act- Subparts B-E (40 CFR 264.10 -.77)	General facility standards, Contingeny Planning, Record keeping, and Reporting	Establishes procedural requirements for the management of a treatment, storage or disposal facility.	TBCs for alternatives utilizing treatment, storage or disposal actions (Note- permits not required for onsite actions)
Treatment, Storage, Disposal Actions --			
Resource Conservation and Recovery Act- Subparts F (40 CFR 264.90 -.101)	Ground Water Protection	Ground water monitoring/corrective action requirements; dictates adherence to MCLs and establishes points of compliance.	TBCs for alternatives which utilize a landfill for the ultimate disposal of hazardous waste materials and/or free liquids.
RCRA - Subpart G (40 CFR 264.110-.120)	Closure/Post Closure Requirements	Establishes requirements for the closure and long-term management of a hazardous disposal facility.	TBCs for alternatives which utilize a landfill for the ultimate disposal of hazardous waste materials and/or free liquids.
RCRA - Subparts K-O (40 CFR 264.220-.351)	Requirements for surface impoundments, waste piles, land treatment, landfills, and incinerators	Outlines design specifications and standards of performance for disposal facilities and treatments.	TBCs for alternatives which utilize a surface impoundment, waste pile, lndfill, land treatment or incineration for disposal of wastes.
RCRA - Part 263 (40 CFR 263.10 - .31)	Transporter Requirements	Requirements for manifesting, permitting and emergency response to a hazardous waste discharge.	TBCs for alternatives involving the off-site shipment of hazardous materials or waste.
Hazardous Materials Transportation Act (49 CFR 170, 171)	Rules for Transporation of Hazardous Materials	Procedures for packaging, labelling, manifesting, and off-site transport of hazardous materials.	ARARs for alternatives involving the off-site shipment of hazardous materials or waste.

(Continued)

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TABLE 2-5. Continued

FEDERAL STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Treatment, Storage, Disposal Actions --			
Clean Air Act (40 CFR 50)	National Ambient Air Quality Standards (NAAQS) - Particulates	Establishes maximum concentrations for particulates and fugitive dust emissions.	ARARs for alternatives involving treatments which impact ambient air.
Clean Air Act (40 CFR 50)	New Source Performance Standards (NSPS)	Requires Best Available Control Technology (BACT) for new sources, and sets emissions limitations.	ARARs for alternatives involving treatments which impact ambient air.
Clean Water Act (40 CFR 401)	General Provisions for Effluent Guidelines and Standards	Requires toxic pollutant discharges be controlled using Best Available Technology Economically Available.	ARARs for alternatives involving treatments which discharge toxic pollutants.
Clean Water Act (40 CFR 401)	NPDES Permit Requirements	Requirement for point source discharge to surface waters.	ARARs for alternatives involving treatments which discharge toxic pollutants to area water bodies.
Clean Water Act (40 CFR 404)	Requirement for Discharge of Dredged or Fill material	Prohibits actions that impact a wetland unless no other practical alternatives are available.	ARAR for alternatives which may impact wetland areas on or in the proximity of the properties (i.e. Great Swamp).

(continued)

TABLE 2-5. Continued

FEDERAL STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Wilderness --			
Wilderness Act (16 USC 1131)	Protection of Wilderness	Requires designated wilderness areas be administered such that they remain unimpaired.	ARAR which addresses the wetland area (i.e. Great Swamp) in the proximity of both properties.
Floodplains --			
Executive Order 11988 (40 CFR 6: App. A)	Flood Plains Management	Restriction on types of activities which can be conducted within a floodplain to minimize harm and preserve natural values.	ARAR as properties are situated within the Passaic River Basin floodplain.
Flood Disaster Protection Act of 1973	Disaster Prevention	Regulates development in flood prone areas under FEMA.	ARAR as properties are situated within the Passaic River Basin floodplain.
National Flood Insurance Act of 1968 (24 CFR 1909)	Flood Insurance	Provides flood insurance for disaster relief and establishes flood control methods.	ARAR as properties are situated within the Passaic River Basin floodplain.
Resource Conservation and Recovery Act	Waste Facility Management	Regulates the design of waste management facilities in a 100 year floodplain.	TBC as properties are situated within the Passaic River Basin floodplain.

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conversion process (40 CFR 61). NESHAPs were established pursuant to Section 112 of the Clean Air Act.

Standards for waste disposal promulgated under 40 CFR 61.152 include requirements for disposal of asbestos in accordance with EPA, OSHA and DOT regulations, and prohibitions to discharge of visible emissions of any asbestos containing waste material.

Standards for inactive waste disposal sites (40 CFR 61.153) include provisions to cover or otherwise manage asbestos containing waste material to discharge no visible emissions to the outside air from an inactive waste disposal site. This standard also prescribes access restrictions for inactive asbestos waste disposal sites.

Additional Federal requirements include those pertaining to public relocation activities (40 CFR 4.2), and worker health and safety requirements established under the Occupational Safety and Health Act (OSHA). For hazardous waste workers, the primary ARARs are those promulgated under 29 CFR 1910, which establish the requirement for 40-hour training of hazardous waste site workers, the development of site-specific safety plans, and worker participation in a certified medical monitoring program.

TCBs associated with treatment, storage and disposal actions appear in Table 2-5. RCRA establishes both administrative (i.e., permitting, manifesting, etc.) requirements and substantive (i.e., design) requirements for remedial actions. For all CERCLA actions conducted entirely on-site, only the substantive requirements must be observed. RCRA requirements of major importance are those identified in this table.

Potential ARARs for treatment actions include those established under the Federal Clean Air Act (CAA), and the Clean Water Act (CWA), which are designed to regulate the types and amounts of contaminants discharged to the environment. The CAA establishes emissions limitations for criteria pollutants (i.e., CO, SO_2, NO_x, etc.), particulates, and toxic pollutants (i.e., asbestos, Hg, Be, vinyl chloride, etc.). New sources must also be equipped with Best Available Control Technology (BACT) to further minimize air emissions. The Federal CWA regulates the effluent discharge to area water bodies (40 CFR 401), and will restrict activities that can be conducted in and around the wetlands (40 CFR 404).

New Jersey Action-Specific ARARs/TBCs

The NJDEP has promulgated regulations similar to those of the Federal government. The potential state action-specific ARARs for the properties appear in Table 2-6. The NJ Hazardous Waste Regulations (NJAC 7:26) establish performance specifications for treatment options, and design requirements for storage, containment, and disposal

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TABLE 2-6. PRELIMINARY IDENTIFICATION OF STATE ACTION-SPECIFIC ARARs/TBCs

STATE STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Treatment, Storage and Disposal Actions --			
NJ Hazardous and Solid Waste Regulations (NJAC 7:26)	Permitting, Contingency Plans, Specifications for Treatment/Disposal Units	Requirements for permitting, emergency planning, and design of treatment/storage/disposal systems.	ARARs for alternatives which involve the treatment, storage or disposal of hazardous wastes
NJ Pollutant Discharge Elimination System (NJAC 7:14A-1.1 et seq)	Permit/Discharge Requirements	Requires any discharger to land or water to obtain a permit pursuant to NJSA (58:10A-1).	ARAR for alternatives involving treatments which disharge effluents to ground surface or surface waters.
NJ Pollutant Discharge Elimination System (NJAC 7:14A-13)	Requirements for Users of Domestic Treatment Works (DTWs)	Rules concerning pretreatment, permitting and water quality violations for users of DTWs.	ARARs for alternatives involving the use of Domestic Treatment Works.
NJ Surface Water Regulations (NJAC 7:9-5.1)	Effluent Standards/ Treatment Requirements	Establishes effluent standards and treatment requirements for discharge of toxic effluent.	ARARs for alternatives involving treatments which discharge toxic pollutants to area water bodies.
NJ Air Pollution Control Regulations (NJAC 7:27-16)	Permits and Emissions Limitations for VOCs	Requires sources which emit VOCs be registered & permitted with the NJDEP & meet design specifications.	ARARs for alternatives involving treatments which impact ambient air.
NJ Air Pollution Control Regulations (NJAC 7:27-17)	Toxic Substances Emissions	Requirement for emissions control apparatus for sources of toxic emissions.	ARARs for alternatives involving treatments which emit toxic pollutants.

(Continued)

TABLE 2-6. Continued

STATE STATUTE	REGULATION/GUIDANCE	SYNOPSIS	APPLICABILITY TO SITE CONDITIONS
Treatment, Storage and Disposal Actions --			
NJ Clean Air Act (NJAC 7:27-13)	Emissions Standards for Toxic Substances	Establishes emissions limitations for toxic substances (i.e., total volatile organics, asbestos).	ARARs for alternatives using treatments which emit hazardous air pollutants.
NJ Air Pollution Control Regulations (NJAC 7:27-12)	Emergency Situations	Requirement for standby plans to reduce emissions of air contaminants during an air pollution emergency.	ARARs for alternatives involving treatments which impact ambient air.

options. Regulations promulgated under (NJAC 7:26) are similar to those promulgated under RCRA (40 CFR 264). The NJ Pollutant Discharge Elimination System regulates the discharge of effluents, and the users of domestic treatment works (DTWs).

The NJ Air Pollution Control Regulations (NJAC 7:27-17) regulates a larger array of emissions than the Federal CAA. NJ Ambient Air Quality Standards and Emissions Standards for Toxic Substances must also be considered ARARs for the properties.

2.1.2 Treatability Studies in Support of the Feasibility Study

No property-specific treatability information has been collected in support of this study. A limited amount of information is available that would be applicable to the design of a remedy at the properties. This information is limited to some engineering studies that were performed by Gypsum in the FS for the Millington Road property. These characterizations include field testing of ACM strength by use of standard penetration tests, cone penetrometer tests, and field vane shear strength. Laboratory evaluation of uncontained, undrained, triaxial shear strength were also performed. The results of these tests support the conclusion that the waste is present in a predominantly horizontally layered deposit with a high degree of variability in the physical characteristics between these layers. No information has been collected in support of alternative treatment technologies (e.g. solidification/stabilization or vitrification).

Geo-Con Inc. recommends laboratory studies for all sites where solidification/stabilization will be applied. Treatability studies generally consider several solidification agents and can be performed in about six weeks. The resulting solidified masses are then evaluated for various physical and chemical characteristics and the results are then compared in order to select the preferred solidification agent. Characteristics which evaluate the long term physical integrity of the sample would be very important in the selection of a solidification agent. Research into previous applications of the solidification/stabilization to asbestos containing waste indicate that laboratory studies have been performed and the results of the study indicate that this method is applicable to ACM (EPA, 1991c). No additional information is available at this time.

2.1.3 Documents Accessed for This Analysis

Sources of information that have been used in developing this FS include:

- Draft final report field sampling and analysis at the White Bridge Road site Meyersville, New Jersey. Prepared for the U.S. Environmental Protection Agency by EPA Technologies. May 7, 1991.

- Draft final report field sampling and analysis at the New Vernon Road site Meyersville, New Jersey. Prepared for the U.S. Environmental Protection gency by EPA Technologies. May 7, 1991.

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- The Record of Decision for the Millington Site, Millington New Jersey. September 30, 1988.

- The Draft feasibility study report, National Gypsum Company, Millington Site, Millington NJ. Prepared by Gypsum. August 1988.

- The Draft remedial investigation report asbestos disposal sites Morris County, New Jersey as well as Appendix I and III of the RI. Prepared by Gypsum. May 29, 1987.

- Draft report review comments on the endangerment assessment for the asbestos dump site Morris County, NJ. by CDM Federal Programs Corporation. July 20, 1987.

- Memos from Ebasco Services Incorporated to Mr. Nigel Robertson of the U.S. EPA Region II June 6; August 2, 1988; regarding reviews of the RI and the FS respectively.

- Revisions and supplements to the RI by Gypsum dated August 1, 1988 and August 5, 1988.

- Final Focused Remedial Investigation Report for the White Bridge Road Site, Meyersville, New Jersey. Prepared by Alliance Technologies Corporation, June 10, 1991.

- Final Focused Remedial Investigation Report for the New Vernon Road Site, Meyersville, New Jersey. Prepared by Alliance Technologies Corporation, June 10, 1991.

2.2 Remedial Action Objectives

This FS evaluates remedies for the New Vernon Road and White Bridge Road properties as part of an Operable Unit of the Asbestos Dump Site. As stated previously, the remedy will focus on the elimination of exposure to asbestos contained in the ACM, surface water, ground water, and air. Therefore, the remedial alternatives will be developed for ACM at the New Vernon Road and White Bridge Road properties.

The primary objective of the FS is to identify an environmentally sound, technically feasible, safe, and cost-effective remedial response for the properties. One aim of this FS is to evaluate remedial alternatives that can achieve cleanup levels for ACM found at the properties. In addition, alternatives will be considered that will prevent exposure and migration of ACM. These alternatives would not achieve cleanup levels but would be protective of human health and the environment.

The results of the Risk Assessment for detected airborne concentrations of asbestos indicate an unacceptable risk of cancer due to inhalation of airborne asbestos at concentrations found at the site. The limitations of asbestos analytical technqiues currently available make establishing health-based cleanup levels difficult. A cleanup level of 0.5 percent asbestos, as detected by the transmission electron micrscopy (TEM) method, has been selected by EPA because it is the best available analytical techique. Thus, the clean up level of asbestos in site soils at the New Vernon Road and White Bridge Road properties is the detection limit of the most sensitive analytic method for asbestos, 0.5 percent asbestos. Soil volumes and areas have been estimated for contaminants of 0.5, one, and ten percent asbestos, respectively on both sites (see Figures 1-4 to 1-7).

Maximum surface water concentrations at the New Vernon and White Bridge Road Sites are 3,200,000 and 2,000,000 fibers/liter respectively. These area below the asbestos MCL of 7 million fibers/liter.

2.3 General Response Actions

General response actions are those remedial actions that will satisfy the remedial response objectives. General response actions for the contaminated media at the New Vernon Road and White Bridge Road properties were formulated based on the results of previous investigations summarized in Subsection 1.2.4 of this report. A listing of medium-specific general response actions for the properties is provided in Table 2-7.

The remedial response objectives for air and surface water can be attained by the implementation of a corrective action that will contain the source of asbestos contamination (i.e., ACM). Because the source of contamination to these media would be eliminated, remediation of these media will not be required. Natural processes such as dilution and particulate settling will act to naturally cleanse both air and water to below levels of concern.

Based on the results of the RI, the asbestos contamination in ground water does not appear to be migrating from the ACM at this time. However, the remedial actions proposed in this report may result in increased mobility of the asbestos in the ground water. Therefore, it is recommended that ground water monitoring be performed as part of all proposed remedial alternatives.

The EPA has made an initial determination for the lateral and vertical extent of ACM at the New Vernon Road and White Bridge Road properties. Estimates are based on the information provided in the Field Sampling and Analysis Reports (EPA, 1990; 1991). Estimated areas and volumes are applied to the general response actions and are summarized in Table 2-8.

Discrete surface areas (i.e., zero to six inches below ground level [bgl]) containing ACM are illustrated in Figures 1-4 and 1-5. Identification of these areas is based on surface soil sampling and subsequent laboratory analyses. Any surface samples

TABLE 2-7. GENERAL RESPONSE ACTIONS FOR THE NEW VERNON ROAD AND WHITE BRIDGE PROPERTIES

Environmental Medium	General Response Actions
Waste/Soils	• No Action • Containment • Treatment • Excavation/Treatment • Excavation/Disposal
Ground Water	• Institutional Controls

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TABLE 2-8. ESTIMATED AREAS AND VOLUMES OF ACM AT THE NEW VERNON ROAD AND WHITE BRIDGE ROAD PROPERTIES.

Property/Location	Area (square feet) Percent Asbestos			Volume (cubic yards) Percent Asbestos		
	> 10.0 %	> 1.0 %	> 0.5 %	> 10.0 %	> 1.0 %	> 0.5 %
New Vernon Road						
Area 1	35,160* 249,500	72,560* 249,500	92,040* 249,500	11,744	12,436	12,797
Area 2	12,800	12,800	12,800	1,070	1,070	1,070
Area 3	560* 21,000	1,560* 21,000	3,090* 21,000	1,536	1,555	1,583
Area 4	7,300	7,300	7,300	310	310	310
Total				14,660	15,371	15,760
White Bridge Road						
Area 1	35,160* 143,700	57,880* 143,700	69,100* 143,700	19,925	20,346	20,554
Area 2	1,600* 9,500	7,200* 9,500	11,410* 9,500	278	381	459
Area 3	0 5,400	0 5,400	940* 5,400	254	254	271
Area 4	600	600	600	20	20	20
Area 5	600	600	600	20	20	20
Total				20,497	21,021	21,324

* ACM present in overlying soil (i.e. zero to six inches bgl) as evidenced by laboratory analyses.

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visually suspected of containing ACM were analyzed by PLM, all others were analyzed by TEM.

For the New Vernon Road property, three discrete surface areas have been identified as containing ACM at concentrations exceeding the clean-up level of 0.5 percent asbestos. One area is located in the proximity of the structures in the northwestern portion of the property; and two relatively large areas, corresponding to the main landfill area, are located in the north-central portion of the property. Figure 1-4 also presents additional contours indicating surface areas containing ACM at concentrations exceeding one and ten percent asbestos, respectively. Lateral extent of ACM was calculated using a planimeter. For the New Vernon Road property, the total estimated area and volume of ACM containing concentrations exceeding 0.5 percent asbestos were approximately 95,130 square feet and 1,760 cubic yards, respectively.

At the White Bridge Road property, three discrete areas containing ACM in surface soils at concentrations exceeding 0.5 percent asbestos. These areas have been identified through laboratory analyses (see Figure 1-5). The majority of ACM in surface soils is located in the proximity of the horse riding track in the east-central portion of the property. For the White Bridge Road property, the total estimated area and volume of ACM were approximately 81,450 square feet and 1,510 cubic yards, respectively.

Thicknesses of ACM in the subsurface are illustrated in Figures 1-6 and 1-7. The vertical extent of ACM is based on visual observations conducted by EPA field personnel during the installation of exploratory soil borings. It is assumed that subsurface ACM identified visually, contains concentrations in excess of ten percent asbestos. Volumes of ACM were evaluated at selected increments of two feet from the ground surface to the maximum visual extent of ACM at each discrete location. These borings went to maximum depths of 96" at White Bridge Road and 72" at New Vernon Road.

For the New Vernon Road property, total estimated area and volume of ACM contained in the subsurface at concentrations exceeding 0.5 percent asbestos were approximately 290,600 square feet and 14,000 cubic yards, respectively.

Similarly for the White Bridge Road property, the total estimated area and volume of ACM contained in the subsurface were approximately 159,800 square feet and 19,820 cubic yards respectively. The volumes of ACM contained in the subsurface soil were then added to corresponding ACM volumes contained in surface soil, (if ACM was detected in the overlying soil at that location). This was necessary to obtain the total volumes of ACM at asbestos concentrations exceeding 0.5, one, and ten percent ACM (see Table 2-8).

No asbestos contaminated ground water has been detected at the New Vernon or White Bridge Road properties. Due to the very low mobility of asbestos in ground water (Fuller 1977), remediation of ground water, at the properties will not be necessary.

2.4 Identification/Screening of Technology Types and Process Options

The technology screening was performed in accordance with the procedures outlined in Section 2.1, with technologies screened on the basis of technical implementability. Figure 2-1 presents the screening results for ACM. General response actions evaluated in Figure 2-1 to address remedial action objectives include: no action, containment, removal/disposal, removal/treatment, and in-situ treatment. Technology types that were determined to be technically feasible for ACM include capping, landfill disposal, stabilization/solidification (both in-situ and ex-situ) and thermal treatment (ex-situ). Physical, biological, chemical, and in-situ thermal treatment technologies were determined to not be applicable for ACM. Figure 2-1 includes a brief description of the individual technologies or process options, and comments on their applicability to the New Vernon and White Bridge Road properties. The technologies or process options which do not pass the screening process are shaded in the figures and will not be considered further. It is noted in the figures whether technologies were screened on the basis of overall technical implementability, specific site characteristics, or waste characteristics which limit the technologies technical implementability.

2.5 Identification of Representative Process Options

Upon identification of those technologies that are technically implementable at New Vernon Road and White Bridge Road, the process options are further evaluated to allow the selection of a representative process option for each technology type. The process options are evaluated on the basis of effectiveness, implementability, and cost. Process option evaluations for ACM are presented in Figure 2-2. The selected representative process options are summarized in Table 2-9. Process options which passed the process screening but were not chosen to be the representative process option are described below.

The native soil/vegetative cap was chosen as the representative alternative from several capping response options due to its effectiveness and relatively low cost. Native soil was selected over other capping materials due to the high water tables at the properties. This condition may pose shrink/swell or flotation problems for an impermeable cap. Since leaching of asbestos does not appear to be a major exposure route, prevention of infiltration was not considered a major design requirement for the cap. The other cap options which were not considered further include: clay cap, asphalt cap, synthetic cap, concrete cap and RCRA multimedia cap.

Offsite landfill disposal of ACM was chosen over the onsite disposal process option during initial technology screening of removal/disposal response actions due to: 1) the potential for easier implementation of offsite landfilling; and 2) a substantial portion of the New Vernon Road property and the entire White Bridge Road property are within the 100 year flood plain (Transamerica, 1991) this raises concerns about landfilling ACM onsite due to the site properties being located within a 100-yr. floodplain.

General Response Action	Technology	Process Option	Description	Comments
No Action	None		No action.	Required for feasibility study analysis and comparison.
Containment	Capping	Clay	Placement and compaction of clay layer over contaminated soils.	Potentially viable.
		Soil/Vegetation	Placement of native soil over contaminated soils with vegetative growth.	Potentially viable.
		Asphalt	Pavement or application of bituminous material over contaminated area.	Potentially viable.
		Concrete	Installation of concrete slab over contaminated area.	Potentially viable.
		RCRA Multimedia	Multilayer cap of compacted clay, synthetic membrane, drainage layer, topsoil and vegetative cover.	Potentially viable.
Removal/Disposal	Landfill Disposal	Off-site Landfill	Excavation of contaminated soils with disposal licensed waste landfill.	Potentially viable.
		On-site Landfill	Construction of landfill on-site for contaminated soil disposal.	Potentially viable.
Removal/Treatment	Stabilization/ Solidification	Cement-based	Soils are mixed with Portland cement, forming rigid concrete matrix.	Potentially viable.
		Pozzolanic	Siliceous material, lime and water mixed with contaminated soils to form rigid matrix.	Potentially viable.
		Thermoplastic	Wastes sealed in deformable plastic matrix.	Not proven in large-scale application.

Screened on basis of:
- Site characteristics
- Waste characteristics
- Technical feasibility

Figure 2-1. Technology screening - White Bridge Road and New Vernon Road ACM.

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General Response Action	Technology	Process Option	Description	Comments
Removal/ Treatment (cont.)	Physical Treatment	Several	Use of physical methods to remove contaminants from soils/wastes.	Not applicable to asbestos-containing material.
	Biological Treatment	Several	Biodegradation of contaminants in soils/wastes.	Not applicable to asbestos-containing material.
	Chemical Treatment	Several	Chemical alteration or collection of contaminants to reduce toxicity.	Not applicable to asbestos-containing material.
	Thermal Treatment	Incineration	Contaminants destroyed by thermal destruction.	Not applicable to asbestos-containing material.
		Vitrification	High-temperature processing of ACM to melt contaminants into non-toxic glass-like product.	Applicable processing units available commercially in the U.S.A.
		Pyrolysis	Contaminants destroyed thermally in the absence of air.	Not applicable to asbestos-containing material.
In-situ Treatment	Stabilization/ Solidification	Cement-based	Soils are mixed with Portland cement, forming rigid concrete matrix.	Potentially viable.
		Pozzolanic	Siliceous material, lime and water mixed with contaminated soils to form rigid matrix.	Potentially viable.
		Thermoplastic	Wastes sealed in deformable plastic matrix.	Not proven in large-scale application.
	Physical Treatment	Several	Use of physical methods to remove contaminants from soils/wastes.	Not applicable to asbestos-containing material.
	Biological Treatment	Several	Biodegradation of contaminants in soils/wastes.	Not applicable to asbestos-containing material.
	Chemical Treatment	Several	Chemical alteration or collection of contaminants to reduce toxicity.	Not applicable to asbestos-containing material.
	Thermal Treatment	Incineration	Contaminants destroyed by thermal destruction.	Not applicable to asbestos-containing material.
		Vitrification	High-temperature destruction of contaminants into non-toxic glass-like product.	Not effective for treating shallow depths of waste due to heat loss at surface.
		Pyrolysis	Contaminants destroyed thermally in the absence of air.	Not applicable to asbestos-containing material.

Screened on basis of:
- Site characteristics
- Waste characteristics
- Technical feasibility

Figure 2-1. Technology screening - White Bridge Road and New Vernon Road ACM (cont.).

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General Response Action	Technology	Process Option	Effectiveness	Implementability	Cost
No Action	None	Not Applicable *	Does not achieve remedial action objectives.	Not acceptable to regulatory units.	None.
Containment	Capping	Clay	Susceptible to cracking.	Easily implemented; future land use restrictions.	Low capital; low maintenance.
		Soil/Vegetation *	Susceptible to erosion.	Easily implemented; future land use restrictions.	Low capital; low maintenance.
		Asphalt	Susceptible to weathering.	Less implementable; future land use restrictions.	Low capital; high maintenance.
		Concrete	Susceptible to weathering.	Less implementable; future land use restrictions.	moderate capital; moderate maintenance.
		RCRA Multimedia	Least susceptible to cracking/ weathering.	Less implementable; future land use restrictions.	Moderate capital; moderate maintenance.
Removal/Disposal	Landfill Disposal	Off-site Landfill *	Eliminates contamination on-site; contamination not treated.	Depends on available off-site capacities.	High capital; no maintenance.
		On-site Landfill	Contains but does not treat contaminants.	Permit required.	Very high capital; moderate O & M.
Removal/Treatment	Stabilization/ Solidification	Cement-based	Treatability study would be required.	Easily implemented, several vendors available.	High capital; low maintenance. More expensive than in-situ treatment.
		Pozzolanic	Treatability study would be required.	Easily implemented, several vendors available.	High capital; low maintenance. More expensive than in-situ treatment.
	Thermal Treatment	Vitrification *	Vitrification process has demonstrated effectiveness for asbestos material.	Only one known commercial vendor available in USA.	Very high capital, no O & M.
In-situ Treatment	Stabilization/ Solidification	Cement-based *	Treatability study would be required	Readily implemented, vendor availability somewhat limited.	Moderate capital, low maintenance.
		Pozzolanic	Treatability study would be required.	Readily implemented, vendor availability somewhat limited.	Moderate capital, low maintenance.

Screened on basis of:
- Site characteristics
- Waste characteristics
- Technical feasibility

• Chosen as representative process option.

Figure 2-2. Process option screening—White Bridge Road and New Vernon Road ACM.

TABLE 2-9. SELECTED REPRESENTATIVE PROCESS OPTIONS FOR ACM AT THE NEW VERNON ROAD AND WHITE BRIDGE ROAD PROPERTIES

Media	Technology	Representative Process Option
ACM	No action	Not applicable
	Capping	Native soil/Vegetative cap
	Landfill disposal	Off-site landfill disposal
	Stabilization/Solidification	In-situ cement-based stabilization/ solidification
	Thermal Treatment	Vitrification

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Vitrification of ACM was chosen as the representative process option for thermal treatment technologies. No other thermal treatment technologies were determined to be applicable to ACM.

In-situ, cement-based stabilization/solidification of ACM was chosen as the representative process option for stabilization/solidification technologies. While the three process options offer the same relative effectiveness in immobilizing ACM, the cement-based process has potential for greater cost-effectiveness over the pozzolanic or thermoplastic processes.

3.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

Remedial alternatives which meet the remedial response objectives are screened by evaluating them against the short- and long-term aspects of effectiveness, implementability and cost. Evaluation criteria are discussed in Table 3-1. In the case of innovative technologies, sufficient data may not exist to allow for an equivalent comparison with other alternatives. If there is a reasonable indication that the alternative utilizing an innovative technology offers significant advantages, it is carried through the screening. The other alternatives retained for detailed analysis are those which present the most favorable evaluation of screening factors while still maintaining a range of treatment and containment technologies.

The current guidance also allows for the minimization or elimination of the screening effort if a limited number of alternatives have been developed. The range of treatment and containment alternatives should be preserved to a reasonable extent for the detailed analysis. A detailed analysis of the remaining alternatives follows the initial screening. Prior to conducting the analyses, alternatives may require further definition.

The technologies and process options developed in Section 2 are combined to form a range of remedial alternatives which address site cleanup to varying degrees.

3.1 Alternative Development

As discussed in Section 1.1., a range of alternatives are developed which meet the criteria established by the NCP for acceptable alternatives, as well as criteria described in the current guidance. Remedial action objectives presented in Section 2.2 are also used in guiding alternative development. Typically, it is at this point that medium-specific actions are combined to form site-wide alternatives. Based on the available data, the asbestos fill and surrounding soils were determined to be the only media of concern. Evaluation of general response actions for other media was determined to be unwarranted within this FS. Monitoring of ground water at both properties has been included in all of the proposed alternatives to allow detection of potential migration of asbestos contamination. Table 3-2 presents the five alternatives that have been formulated as well as the specific NCP and guidance criteria that each alternative addresses. These alternatives are also summarized in Table 3-3.

3.2 Alternative Description

Each of the alternatives presented in Table 3-3 is described below. The descriptions include such information as the location of excavation or containment areas, and the volumes of soil to be excavated or treated. The thought process involved in the development of alternatives is also described.

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TABLE 3-1. CRITERIA USED IN INITIAL SCREENING OF REMEDIAL ALTERNATIVES

Effectiveness

- Ability to provide protection of human health and the environment
- Ability to reduce toxicity, mobility, and/or volume of contamination
- Effectiveness in short-term (construction and implementation period)
- Long-term effectiveness (post-remediation)

Implementability

- Technical feasibility
- Administrative feasibility
  - regulatory acceptance
- Availability of services and materials
  - availability of treatment, storage, and disposal facilities
  - equipment availability
  - trained personnel availability

Cost Evaluation

- Capital costs
- O&M costs

TABLE 3-2. RANGE OF ALTERNATIVES

Guidance Criteria	Treatment Range No Action	Containment with Little or No Treatment	Minimize Long-Term Management	Treatment as Primary Component	Innovative
Description					
1. No Action	X				
2. Native Soil/ Vegetative Cap		X			
3. ACM Excavation and Offsite Vitrification			X	X	X
4. In-situ Stabilization/ Solidification			X	X	X
5. ACM Excavation and Offsite Landfill Disposal		X			

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TABLE 3-3. REMEDIAL ALTERNATIVE SUMMARY TABLE

- No action
- Native Soil/Vegetative Cap
- ACM excavation and off-site vitrification
- In-situ, cement-based stabilization/solidification
- ACM excavation and off-site landfill disposal

3.2.1 No Action Alternative

The no action alternative would involve no remedial response activities at the White Bridge Road and New Vernon Road properties. The no action alternative would not meet remedial action objectives. Consideration of the no action alternative is required by both the current guidance and the NCP.

3.2.2 Native Soil/Vegetative Cap Alternative

This alternative is composed of capping the asbestos contaminated areas to minimize precipitation infiltration and fugitive dust emissions. Monitoring of ground water would also be conducted at both properties under this alternative.

A layer of native soil would be placed over areas encompassing the locations where ACM in excess of 0.5 percent has been detected. A vegetative layer would be grown in topsoil placed over the cap to prevent cap erosion. Berms constructed of clean fill would be placed around the perimeter of the capped areas to provide surface water control. The total cap areas are estimated to be 18,500 square yards or 3.8 acres for the White Bridge Road property and 32,200 square yards or 6.7 acres for the New Vernon Road property.

This alternative was developed to meet both current guidance and NCP criteria for alternative development. Capping meets guidance criteria which call for a containment alternative with little or no treatment.

3.2.3 ACM Excavation with Off-Site Vitrification Alternative

For this alternative, ACM would be excavated and thermally treated off-site with a vitrification process marketed by Vitrifix North America, Inc. (Vitrifix). The Vitrix process is a demonstrated technology that renders asbestos waste non-toxic by thermal decomposition. The end product of the process produced by Vitrifix which has been

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determined by EPA to be nontoxic, is used as a road surfacing material. Approximately 21,390 cubic yards of material from the White Bridge Road property and 16,140 cubic yards from the New Vernon Road property would require excavation, transportation and treatment.

This alternative was developed to meet both NCP and current guidance criteria. The characteristics of the chosen treatment method allow this method to conform with the current guidance criterion for an alternative that provides treatment as a primary component and minimizes long-term management. The vitrification process is also considered an innovative technology.

3.2.4 In-Situ Stabilization/Solidification Alternative

For this alternative, ACM would be treated in-situ using the stabilization/solidification process marketed by International Waste Technologies/Geo-Con. This process would limit the mobility of site ACM without requiring excavation.

As part of the development of this process an appropriate solidification agent would be selected based on the results of laboratory studies performed on the ACM.

This alternative was developed to meet both NCP and current guidance criteria. This alternative will provide treatment as a primary component and retains an innovative technology, per the current guidance.

3.2.5 ACM Excavation and Off-Site Landfill Disposal Alternative

For this alternative, ACM would be excavated, containerized, and transported off-site for landfilling at a regulated disposal facility under this alternative. Based on volume estimates presented previously, it is estimated that 21,390 cubic yards of asbestos waste material would be excavated from the White Bridge Road property, and 16,140 cubic yards of material from the New Vernon Road property, and disposed off-site at a landfill. This alternative was developed to consider an off-site containment alternative.

3.3 Alternative Screening

Screening of alternatives is performed subsequent to their description. The objective of alternatives screening is to narrow the list of potential alternatives that will be evaluated in greater detail (based on their effectiveness, implementability, and cost). This screening aids in streamlining the feasibility study process while ensuring that the most promising alternatives are being considered. Whatever the scope of the screening effort, the range of treatment and containment alternatives initially developed should be retained through the screening process.

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The five alternatives developed for the properties present a wide range of General Response Actions. These include two alternative approaches for excavation and off-site disposal (vitrification and landfilling) as well as two in-situ alternatives (stabilization/solidification and capping). These alternatives will present a range of costs as well as treatment technologies. Since it is desirable to retain a wide range of alternatives, all five remedial alternatives will be carried through the detailed analysis.

For the detailed analysis of alternatives presented in Section 4, the alternatives will be as follows:

Alternative 1:	No action
Alternative 2:	Native Soil/Vegetative Cap
Alternative 3:	ACM excavation and off-site vitrification
Alternative 4:	In-situ stabilization/solidification
Alternative 5:	ACM excavation and off-site landfill

4.0 DETAILED ANALYSIS OF ALTERNATIVES

In this section, the assembled remedial alternatives are described and evaluated in detail. The descriptions are presented by first discussing work components common to several alternatives, then describing each alternative completely. Upon completion of individual analyses, a comparative analysis of alternatives is presented.

The current guidance calls for a detailed analytical process which consists of nine evaluation criteria. Two of the nine evaluation criteria relate directly to statutory findings that must ultimately be made in the Record of Decision (ROD). Each alternative must meet these threshold criteria, which are as follows:

- Overall Protection of Human Health and the Environment
- Compliance with ARARs

Specific analysis considerations associated with these criteria are summarized in Table 4-1.

Five of the nine criteria represent the primary criteria on which the detailed analysis is based. These include the following

- Long-term Effectiveness and Permanence
- Reduction of Toxicity, Mobility and Volume through Treatment
- Short-term Effectiveness
- Implementability
- Cost

Specific analysis considerations associated with these criteria are also summarized in Table 4-1.

The final two criteria are evaluated following comment on the FS report and proposed remedial plan, and are addressed once a final decision is being made and the ROD is being prepared. These criteria include:

- State Acceptance
- Community Acceptance

Upon completion of individual alternative analyses, a comparative analysis of the alternatives is conducted. The advantages and disadvantages of alternatives relative to each other are evaluated so that key tradeoffs between alternatives can be identified.

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TABLE 4-1. SPECIFIC ANALYSIS CRITERIA CONSIDERATIONS

Overall Protection of Human Health and the Environment

- Protection of human health and the environment
- Elimination, reduction or control of site risks for each potential exposure pathway
- Short-term or cross-media impacts and the risks associated with them

Compliance with ARARs

- Compliance with chemical-specific ARARs
- Compliance with location-specific ARARs
- Compliance with action-specific ARARs

Short-Term Effectiveness

- Protection of community during remediation
  - risks to community
  - mitigation of risks
  - uncontrollable risks
- Protection of workers during remediation
  - risks to workers
  - mitigation of risks
  - uncontrollable risks
- Environmental impacts
  - mitigation of impacts
  - unavoidable impacts
- Timeframe for achieving remedial response objectives

(continued)

Implementability

- Technical feasibility
  - construction and operation
  - reliability of technology
  - ease of undertaking additional remedial action
  - monitoring considerations
- Administrative feasibility
  - coordination with other agencies
  - required permits
- Availability of services and materials
  - off-site treatment, storage capacity and disposal services
  - equipment and technical specialists
  - prospective technologies
  - potential for obtaining competitive bids

Long-Term Effectiveness and Permanence

- Magnitude of residual risk at conclusion of remediation
  - numerical standards (*e.g.*, cancer risk levels, volume or concentration of remaining contaminants)
  - residual characteristics (treatment residuals and untreated residual contamination)
  - need for 5-year review

(continued)

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TABLE 4-1. (continued)

Long-Term Effectiveness and Permanence (continued)

- Adequacy and reliability of controls in managing treatment residuals or untreated wastes
    - containment systems
    - institutional controls
    - long-term management
    - long-term monitoring
    - O&M
    - potential need for future replacement
    - risks associated with future replacement
    - long-term uncertainties and difficulties and degree of confidence associated with controls Implementability

Reduction of Toxicity, Mobility or Volume Through Treatment

- Treatment process and materials to be treated
- Amount of hazardous materials destroyed or treated
- Degree of reduction in toxicity, mobility or volume
- Degree of irreversibility of treatment method
- Type and quantity of treatment residuals
- Compliance with statutory preference for treatment as a principal element

Cost

- Direct capital costs
    - construction
    - equipment
    - land and site development
    - buildings and services
    - relocation
    - disposal

(continued)

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TABLE 4-1. (continued)

Costs (continued)

- Indirect capital costs
  - engineering
  - licenses or permits
  - start-up and shakedown
  - contingencies
- Annual O&M
  - operating labor
  - maintenance materials and labor
  - auxiliary materials and energy
  - residue disposal
  - purchased services
  - administration
  - insurance, taxes and licensing
  - contingencies
  - rehabilitation
  - periodic site review
- Accuracies within +50 to -30 percent
- Present worth analysis
- Sensitivity analysis

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4.1 Work Elements Common to Several Remedial Alternatives

The following describes those components which are common to several of the remedial alternatives. Table 4-2 illustrates common elements for each of the remedial alternatives.

4.1.1 Mobilization/Site Preparation

Prior to any major site work, equipment must be mobilized to the site and the locations of operations trailers established. It is anticipated that one trailer at each property will be necessary for storage of equipment, soil samples, and for control of site operations. Access to the site will be closely monitored. Fencing will be placed around the perimeters of the properties to restrict access. Warning signs will be posted and additional temporary fencing will separate the area where greater health and safety precautions are necessary (the "hot" zone). The office trailers will be situated outside the "hot" zone. A decontamination zone will be located upwind between the "hot zone" and the support ("clean") areas. Heavy equipment will be stored in the area of greatest access restrictions.

As part of the site preparation activities the areas of surficial tile contamination will be consolidated into areas of more extensive contamination. This will facilitate all active remedial alternatives considered for the properties. Areas of surficial tile contamination include the surficial soil under the paved driveways at the New Vernon Road Site.

4.1.2 Ground Water Monitoring

Due to the limited data available on ground water characterization, installation of ground water monitoring wells with quarterly sampling has been included in three of the alternatives. Four wells would be installed at each of the properties. Three of the wells would be located downgradient of asbestos fill areas along the site perimeters to detect offsite migration of asbestos. The remaining well would be placed upgradient of each property to provide background asbestos information.

A Ground Water Sampling Program would be conducted for thirty years under Alternative 2 due to asbestos fill material remaining in place without treatment. Monitoring results would be assessed every five years and the program would be adjusted accordingly.

For Alternative 4, the ground water monitoring program would be implemented for five years following completion of remedial actions. A determination on the need t(continue ground water monitoring would be made following the five years of monitoring activities.

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TABLE 4-2. COMMON ELEMENTS IN THE REMEDIAL ALTERNATIVES

	Mobilization/ Site-Preparation	Years of Ground Water Monitoring	Runon/ Runoff Controls	Air Monitoring	Dust Control	Equipment Decontamination	Soil Sampling	ACM Excavation	Grading and Revegetation
Alternative 1: No Action		0							
Alternative 2: Clay/Vegetative Cap	X	30		X	X	X			X
Alternative 3: ACM Excavation and Off-Site Vitrification	X	5	X	X	X	X	C	X	X
Alternative 4: In-situ Stabilization/ Solidification	X	5		X	X	X	P		
Alternative 5: ACM Excavation and Off-Site Landfill	X	5	X	X	X	X	C	X	X

C = Confirmation and QA/QC Sampling
P = Post-Remediation and QA/QC Sampling

In addition to ground water monitoring for off-site asbestos transport, it may be necessary to monitor for transport of ground water contaminated by organic chemicals. This monitoring will be required for all remedies which leave the ACM in place. This activity will be necessary only if organic chemical contamination is confirmed as part of the Remedial Design investigation.

If necessary, ground water monitoring for organic chemicals will occur for 30 years in the case of capping and for five years in the case of stabilization/solidification. After five years the necessity to continue organic chemical monitoring will be re-evaluated. Because no conclusive evidence for the presence of organic contamination has been found, the cost of organic monitoring has not been included in the cost estimate for Alternatives 2 and 4.

4.1.3 Run-on/Run-off Controls

For Alternatives 3 and 5, which includes ACM excavation, a run-on control system will be constructed using berms to divert run-on away from excavated areas. Berms will be constructed around excavation areas using clay soil, and will be designed to divert run-on for the 25-year, 24-hour storm. A run-on/run-off control system will also be used in association with the alternative involving capping to prevent cap erosion.

4.1.4 Air Monitoring

An air monitoring program will be implemented during site activities to monitor airborne asbestos fibers, and particulate contaminant emissions. Air monitoring site at the site will be performed in accordance with all applicable regulations.

4.1.5 Dust Control

Due to excavation and mixing activities required during some of the alternatives, dust generation may cause the release of asbestos contaminants. Each area will be sprayed lightly with a dust suppressant before and during excavation. The suppressant will be applied using a portable pump and hand-spray nozzle, connected to a 100-gallon tank, and will be applied to excavated areas at a rate sufficient to minimize dust generation. Dust suppressant will be delivered to the tank via a truck as needed.

4.1.6 Equipment Decontamination

Heavy equipment decontamination will be performed at a designated decontamination area away from excavation activities. Heavy equipment will be thoroughly cleaned before leaving the site, in accordance with EPA guidance (U.S. EPA, 1985). The decontamination pad will be constructed to allow collection of all rinse water. Sampling equipment will be decontaminated within the "hot" zone. Rinse water and disposable

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materials used for equipment decontamination will be collected and disposed of offsite in accordance with regulations.

4.1.7 Soil Sampling

Soil sampling methods are dependent on the particular remedial alternative chosen. Alternatives involving ACM excavation will involve confirmation sampling after excavation to ensure that all ACM is removed. In-situ treatment methods will require post-remediation sampling.

Excavation will cease after all identified ACM has been removed. Confirmation samples will be collected at the bottom of the excavation areas to confirm that the established cleanup level has been met. If levels above 0.5 percent asbestos are measured, additional excavation will be necessary and confirmation sampling must be repeated.

For alternatives involving in-situ treatment only, post-remediation sampling will be conducted to confirm that in-situ treatment has effectively reduced the mobility of contamination. Borings will be randomly advanced at the perimeter of each treated area. Each boring will be drilled with continuous split spoon samples collected.

Samples will be collected and submitted for asbestos analysis. If samples exhibit asbestos levels greater than the cleanup level, in-situ treatment will be extended.

For all soil sampling activities, appropriate QA/QC sampling must also be performed, including blind duplicates, field blanks, trip blanks, and internal laboratory QA/QC samples.

4.1.8 ACM Excavation

The ACM will be excavated and segregated using backhoes (one cubic yard capacity) for greatest control, in accordance with conventional excavation techniques used in hazardous waste site work. Because of the volume of material found at the properties, bulk containerization would be the most timely and cost effective method of removal.

Two approaches will be taken during excavation depending on the method of ultimate disposal. In both instances the excavated ACM is transported in air-tight and leak-tight containers, however, the vitrifix process does not require that the material be bagged prior to processing.

For offsite disposal using vitrification, the ACM will be placed directly into 30 cubic yard, roll-off containers following removal to limit excessive disturbance of asbestos wastes. The containers will then be sealed with plastic sheeting so they will be air-tight and leak tight.

In the case of excavation for disposal at an off-site landfill, the ACM must be bagged prior to off-site landfilling. The ACM would be handled using a similar method as that proposed by Gypsum in the Draft Feasibility Study for the Millington Site (Gypsum, 1988).

It is anticipated that approximately 21,300 cubic yards of ACM will be excavated at the White Bridge Road property and approximately 15,800 cubic yards at the New Vernon property. Confirmation sampling will proceed immediately following completion of excavation activities. Excavation activities will be conducted in accordance with regulations using proper dust suppression controls and containerization of wastes.

For alternatives requiring excavation, ground water collection trenches would be constructed upgradient of the excavation areas of both properties. The trenches will divert ground water flow around the excavation areas to allow dewatering of the ACM. The amount of drain water removed from the trench will depend on the nature of the ACM at the excavation. It will be necessary to strike a balance between keeping the ACM saturated and thus, reducing air emissions, and draining the ACM to facilitate handling of the ACM.

In addition, EPA recommends providing an air enclosure of the excavation of the ACM. A temporary structure will be erected over each section of the site that is to undergo excavation. This structure will be of a design that will aid in the control of airborne asbestos and dust resulting from the excavation process. Since the area to be excavated is of a size so as to make the construction of a single structure capable of enclosing the entire area unfeasible, it will be necessary to construct one, smaller structure and move it as the excavation progresses. The additional time needed for the erection of the structure is approximately one month. Another month (distributed throughout the excavation period) will be required for movement of the structure (both within and between sites).

Costs associated with this structure include the cost of the structure itself, shipping charges, cover construction, moving (which would require the use of a crane), exhaust air asbestos emission reduction, decontamination, and removal.

Water levels in adjacent wetlands will be monitored throughout the cleanup activities. Care will be taken to restore the site topography in such a way so that is compatible with continued occupation of the site. If a decrease in surface water elevation due to dewatering activities at the site is detected in the wetlands, water removed from the site will be re-introduced into the subsurface via infiltration trenches downgradient of the excavation activities.

4.1.9 Grading and Revegetation

Grading is a necessary component of remedial measures that require the excavation of ACM as well as the alternative which includes capping. It will improve surface water drainage characteristics and restore the disturbed areas following excavation activities. Care will be taken to restore the site topography in such a way that impact on continued occupation of the site will be minimized to the extent practicable. For excavation alternatives which do not include onsite treatment, clean fill, obtained offsite, will be brought to the excavated areas for backfill. The cover material will be graded to the elevation of the surrounding ground surface. The area will be revegetated to stabilize the backfill material. Revegetation will also be used to stabilize the berms constructed to manage surface run-on/run-off.

4.2 Detailed Alternative Definition

In Section 3.2, descriptions of alternatives, documentation of the logic behind alternative selection, and acceptable process options represented by those used in the alternative were presented. This section further defines the various elements of the each alternative, implementation of the elements, the timeframe required to achieve cleanup and the common elements included in each alternative.

4.2.1 Alternative 1 - No Action

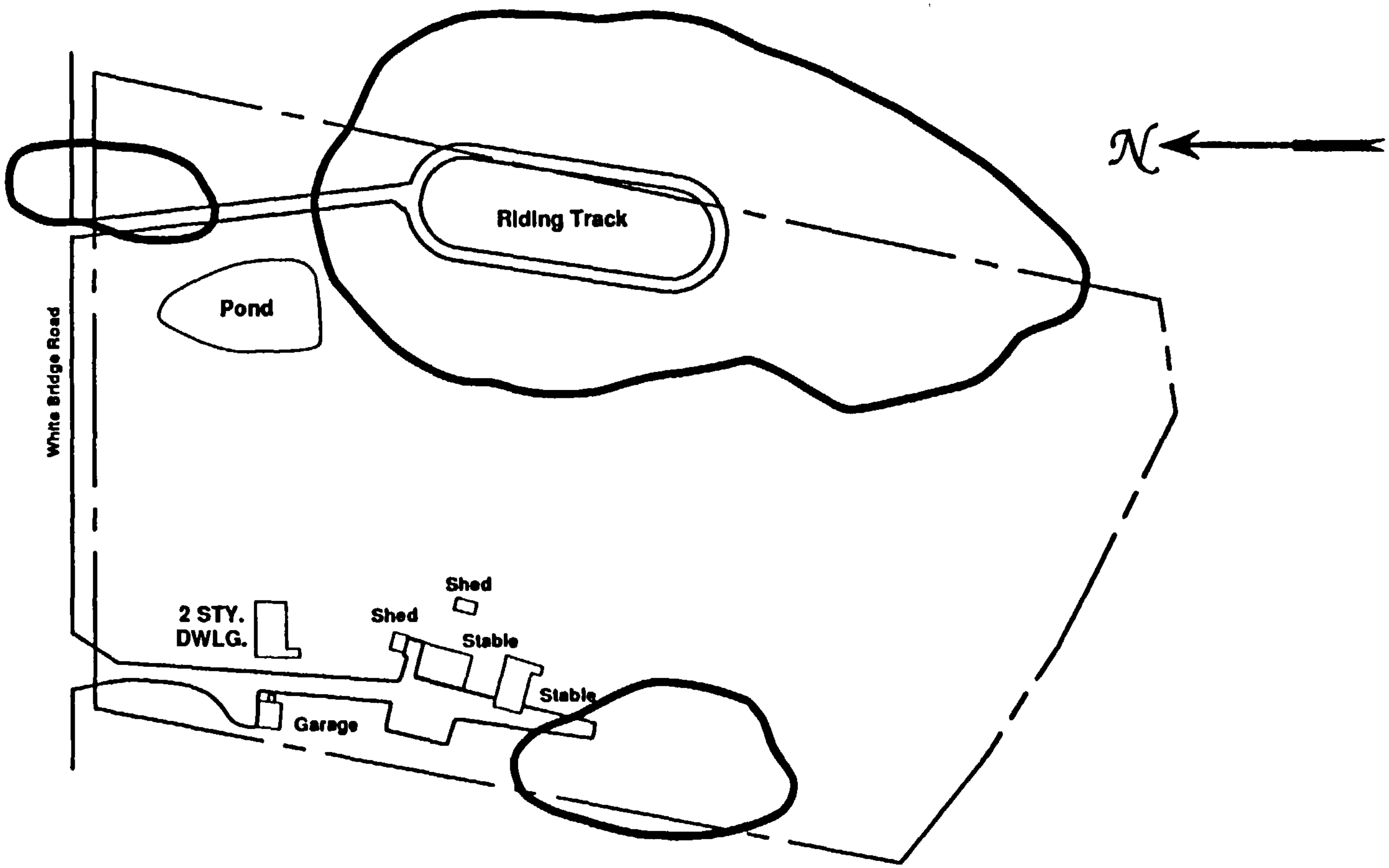
The No Action alternative, although not protective of human health and the environment, is analyzed for purposes of comparison with other alternatives, as required by the NCP and the current guidance. This alternative would leave both properties in their present condition, with no remedial effort implemented. Access to both properties is currently not restricted. No measures to mitigate contaminant migration or to reduce contaminant concentrations would be taken. The remedial action objectives will not be attained.

4.2.2 Alternative 2 - Soil/Vegetative Cap

This alternative includes the following work elements described in Section 4.1: Mobilization/Site Preparation, Run-on/Run-off Controls, Air Monitoring, Ground Water Monitoring, Equipment Decontamination, Grading and Revegetation.

Capping the ACM on-site will prevent long-term direct contact with contaminants at or near surface grade, and will allow for the minimization of the continued leaching of contaminants or emission of fugitive dust. The cap would be constructed of clean soil bought off-site and subsequently seeded with vegetation that will prevent cap erosion.

At the White Bridge Road property, three discrete areas totalling approximately 18,500 square yards will be capped as shown on Figure 4-1. For the New Vernon Road property, two discrete caps would cover a total area of approximately 32,200 square yards, as shown on Figure 4-2. The caps would cover zones of asbestos contamination at levels exceeding the action level of 0.5 percent asbestos. Construction of the cap would begin with initial grading of surface soils to provide an even base upon which to place cap materials. A two-foot layer of topsoil would then be placed over the graded surface



LEGEND

- – – – Property Line
- Area to be Capped

0 200
SCALE = feet

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NEW JERSEY ASBESTOS—WHITE BRIDGE ROAD SITE

Figure 4-1. Capped areas.

A91-170/B

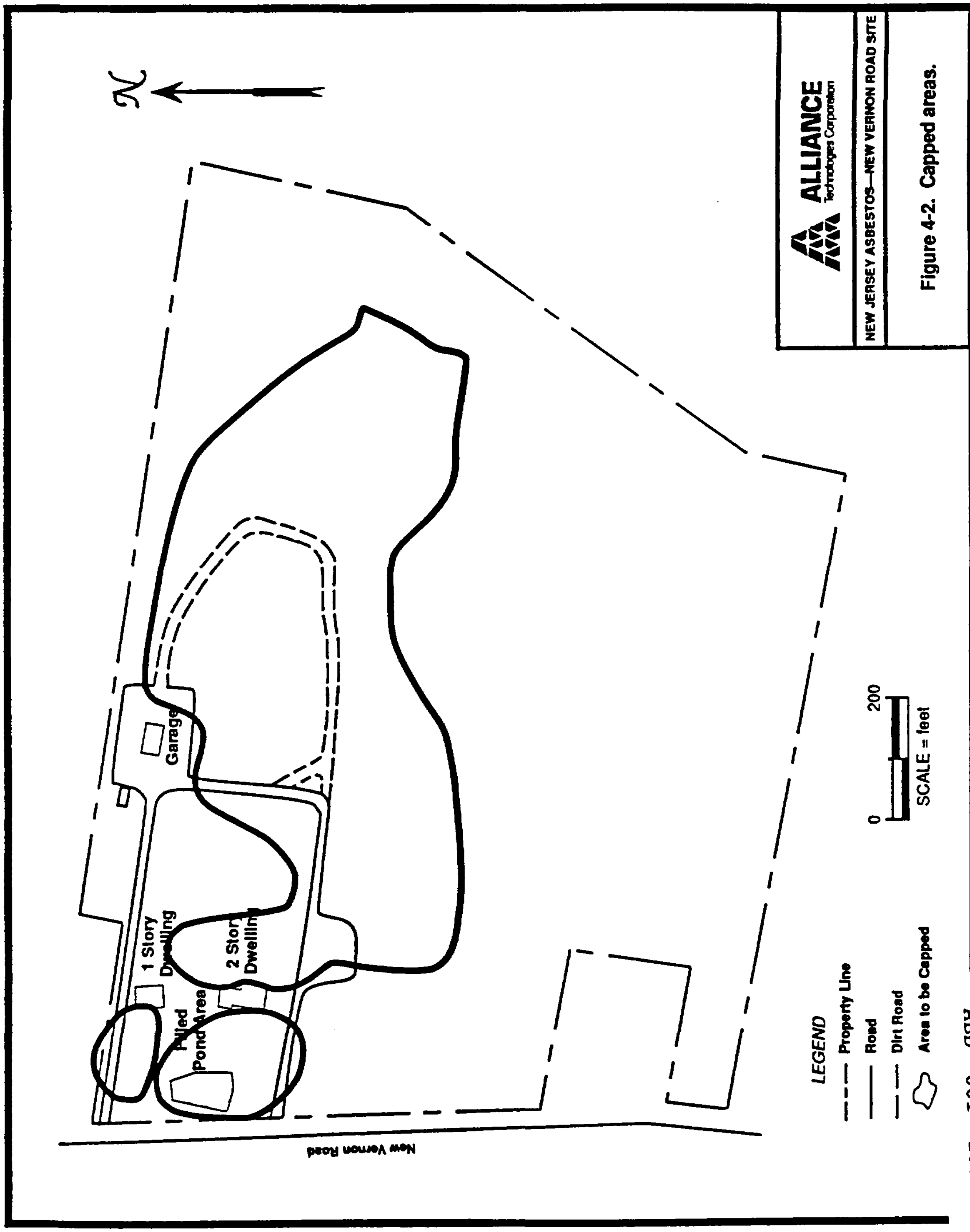

Figure 4-2. Capped areas.

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soils. The final slope of the cap would be graded to 3 percent and 5 percent to promote positive drainage. The topsoil would be seeded to provide erosion resistance. This alternative is estimated to require at least six months for implementation, primarily due to soil placement and grading. Pre-mobilization activities have not been included in the estimate of alternative duration. It is expected that on additional six months to a year would be required for design and contractor selection activities.

The cap must be maintained to ensure continued performance. Inspection of the cap would be performed on a monthly basis, and occasional mowing would be necessary to preclude the establishment of deep-rooted vegetation. Berms would be constructed and maintained to prevent run-on and handle run-off from the capped areas. Inspection and maintenance of the caps would be conducted for a minimum of 30 years.

4.2.3 Alternative 3 - ACM Excavation and Off-Site Vitrification

This alternative includes the following work elements described in Section 4.1: Mobilization/Site Preparation, Run-on/Run-off Controls, Air Monitoring, Ground Water Monitoring, Dust Control, Equipment Decontamination, Soil Sampling, ACM Excavation, Grading and Revegetation.

Most of the components of this alternative have been described previously with the exception of off-site vitrification of ACM. ACM excavation was described in Section 4.1.8.

This alternative could be completed within an estimated seven month timeframe. Excavated ACM would be loaded directly into containers to minimize material handling. Premobilization activities are not included in this time estimate.

Containerized ACM would be transported approximately 250 miles to an off-site vitrification facility located in Medina, New York.

The facility is expected to begin operations in January, 1992. Company sales representatives have stated that the facility is currently permitted to accept ACM for temporary storage prior to the startup of the facility. The material would be stored in a 100,000 square foot sealed building. Temporary storage space for the excavated ACM from both properties was determined to not be available.

In the vitrifix process, ACM is electronically heated in a glass-making furnace. A mixture of the ACM and waste glass are fed into the unit and heated to approximately 2600°F. Asbestos is thermally decomposed and rendered nontoxic by the vitrification process. Following vitrification, the fragmented, glass-like material is used in several applications, including road surfacing.

The total number of round-trips required to transport all ACM to the Medina, NY facility is estimated to be approximately 1,250. The timeframe to achieve remediation for this alternative is approximately eight and one-half months. This duration time is based primarily on ACM excavation and transportation and does not include pre-mobilization activities such as contractor procurement.

4.2.4 Alternative 4 - In-Situ Stabilization/Solidification

This alternative includes the following work elements described in Section 4.1: Mobilization/Site Preparation, Air Monitoring, Ground Water Monitoring, Soil Sampling and Equipment Decontamination.

For Alternative 4, in-situ stabilization/solidification, would be implemented at both properties using the International Waste Technologies/Geo-Con process. The areas treated using the IWT/Geo-Con process would be similar to the aerial extent of the caps shown on Figures 4-1 and 4-2. The depth of treatment would be determined based on the vertical extent of asbestos contamination. Based on preliminary calculations, approximately 21,300 cubic yards of ACM at the White Bridge Road property and 15,800 cubic yards of ACM at the New Vernon Road property would be treated in-situ.

The stabilization/solidification process consists of two components: 1) the IWT batch mixing plant that supplies the slurry feed of cement and proprietary chemicals; and 2) the Geo-Con Deep Soil Mixing system which delivers the slurry feed and mixes it with the waste materials in-situ.

In the IWT batch mixing plant on site, chemical additives from a storage silo are fed to a tank and mixed with water on site. A pump then feeds the slurry to the deep mixing system drill rig. Cement and supplementary water are also pumped to the drill rig (Figure 4-3). The deep soil mixing system consists of one set of cutting blades and two sets of mixing blades attached to a vertical drive auger, which rotate at approximately 15 rpm. Two conduits in the auger allow for injection of the slurry/water feed. Additive injection occurs on the auger down stroke, with further mixing occurring upon withdrawal of the auger. The treated soil columns, with a diameter of 36 inches, are positioned to provide an overlapping pattern. For large-scale applications, a four-auger machine is used. The overlapping column arrangement is still retained with the four-auger system. The deep soil mixing system can be used for several soil types in most climates with treatment capabilities to a depth in excess of 100 feet. It is anticipated that this technology will be well suited to these properties.

For cost estimation purposes, a preliminary estimate of time to cleanup ACM to below action levels using in-situ stabilization/solidification is approximately eleven and one-half months. This timeframe includes two months for treatability testing/mobilization and one month for site restoration. Pre-mobilization activities are not included in the timeframe estimate.

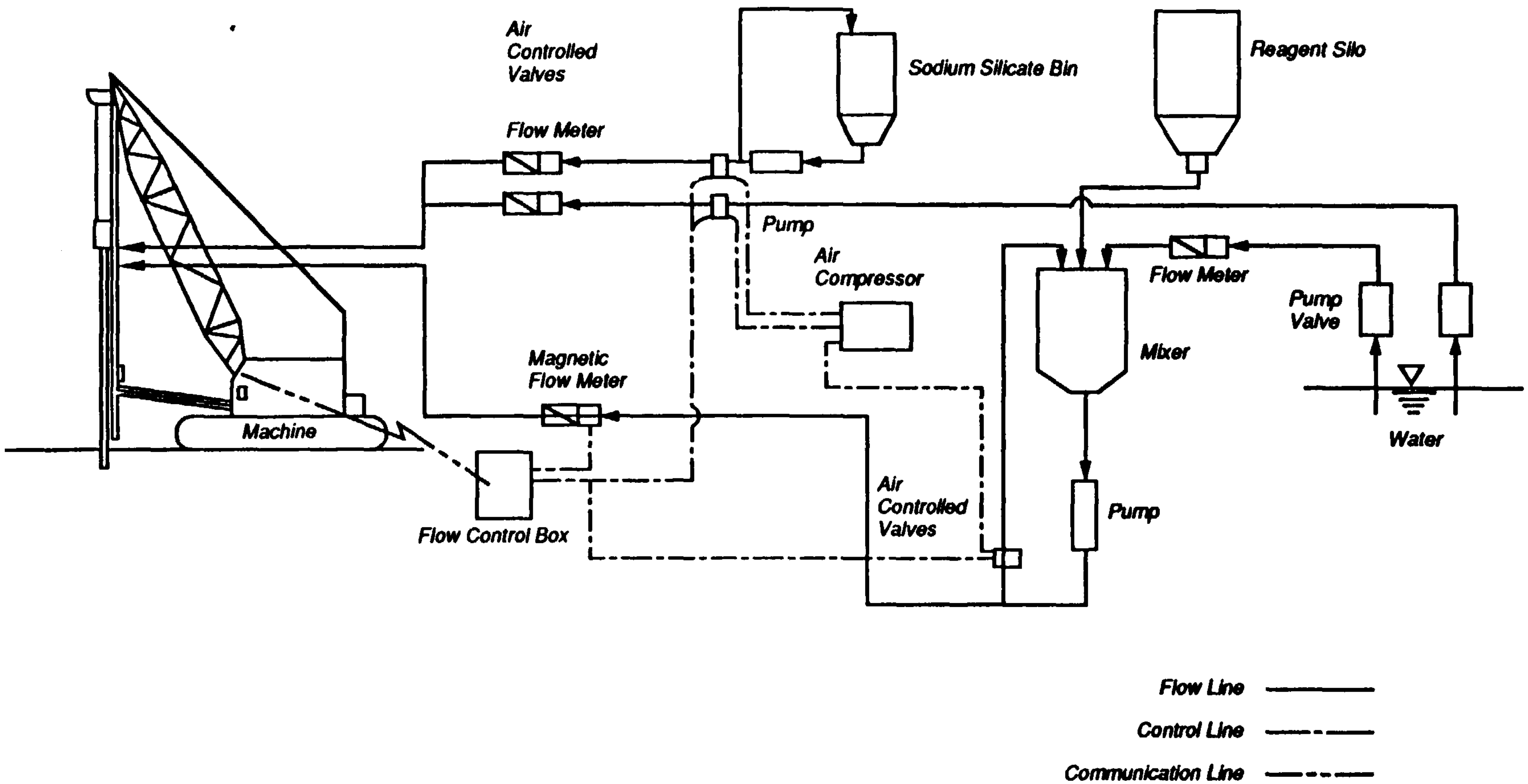

Figure 4-3. Process flow diagram for the IWT/Geo-con in-situ stabilization/solidification system. (reference: EPA/540/A5-89/004, August 1990).

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In the case of the New Vernon Road Site, two fill areas exist near the dwelling one in front of the dwelling, one behind. It is anticipated that the solidification stabilization of these areas will take approximately two weeks.

4.2.5 Alternative 5 - ACM Excavation and Off-Site Landfill Disposal

This alternative includes the following work elements described in Section 4.1: Mobilization/Site Preparation, Run-on/Run-off Controls, Air Monitoring, Ground Water Monitoring, Dust Control, Equipment Decontamination, Soil Sampling, ACM Excavation, Grading and Revegetation.

Most of the components of this alternative are the same as those described in Alternative 3. The major difference between these alternatives is in the way that the ACM is processed after excavation.

The ACM must be bagged prior to offsite landfilling. Bulk containerization of the ACM has been addressed by Gypsum (Gypsum, 1988). The method proposed here is the same as that discussed by Gypsum. The excavated ACM is stockpiled in a staging area. Large material will then be crushed and vacuum pumped into a closed truck/tank car which has been lined with a 10 mil thick plastic liner. The liners are then sealed, unloaded and used to transport the asbestos. At the landfill, the bagged material is removed and covered.

An alternative method of managing the ACM can include the handling of the material in a slurry form. This would reduce the likelihood of airborne emissions resulting from the excavation and transport of the ACM. However, the slurry is considered a liquid waste and the selected landfill will not accept liquid waste.

This alternative could be completed within an estimated eight month timeframe.

Containerized ACM would be transported approximately 65 miles to the Grand Central Sanitation landfill which accepts ACM, this facility is located in Pen Argyl, Pennsylvania. The facility presently accepts ACM. Advanced notice of 24 hours is required for disposal at the site.

The total number of round-trips required to transport all ACM, to the landfill is estimated to be approximately 1,250. The timeframe to achieve remediation for this alternative is approximately nine and one-half months. This duration time is based primarily on ACM excavation and transportation and does not include pre-mobilization activities such as contractor procurement.

4.3 Individual Analysis of Alternatives

Each of the alternatives is evaluated against seven of the nine criteria as defined in the current guidance as modified at the beginning of this section. The remaining two criteria, Support Agency Acceptance and Community Acceptance, are not addressed.

Cost estimates were developed on the basis of cost criteria presented in Table 3-1. Detailed cost estimates for the alternatives are presented in Appendix A.

4.3.1 Alternative 1 - No Action

4.3.1.1 Long-Term Effectiveness and Permanence

The no action alternative would provide no reduction in risk and does not utilize controls to treat or manage wastes. The no action alternative provides no source removal through remediation. Risks associated with existing soil contamination or potential risks associated with leaching of components from the ACM are not addressed.

4.3.1.2 Reduction of Toxicity, Mobility or Volume Through Treatment

The no action alternative does not include treatment or containment methods. There is little protection against the migration of ACM, either through the leaching of ACM conta mination, runoff, or fugitive dust emissions. The mass or volume of contaminants would not be reduced. This alternative does not satisfy the statutory preference for treatment as a principal element.

4.3.1.3 Short-Term Effectiveness

The short-term impacts of the no action alternative would be unchanged from the current risks posed by the properties. No elevated short-term risks would result from the implementation of this alternative. However, the potential for human and environmental exposure would not be reduced, and remedial action objectives would not be achieved.

4.3.1.4 Implementability

This alternative is implementable.

4.3.1.5 Cost

No cost would be associated with the no action alternative. However, if left unremediated the site is a legal liability and as such a liability risk exists due to continued exposures occurring from the migration of asbestos away from the site.

4.3.1.6 Compliance with ARARs

The No Action Alternative provides limited compliance with ARARs and the remedial action objectives. The No Action Alternative does not reduce the potential for migration of asbestos from fill areas into ground water, surface water and air. Access to the Site and direct contact with exposed wastes is not limited. The potential for future airborne releases from exposed asbestos areas is not reduced or precluded.

In conjunction with the limited compliance with ARARs, the No Action Alternative provides limited overall protection of the public health and environment. The public may be exposed through access and ingestion or direct contact with exposed waste materials, and inhalation of airborne asbestos that may be transported in the future.

The no action alternative does not reduce the volume, mobility or toxicity of the wastes. Although this alternative clearly does not meet remedial action objectives, the current NCP (40 CFR 300) requires that no action be included in the analysis for comparative analysis with other remedial alternatives.

4.3.1.7 Overall Protection of Human Health and the Environment

This alternative provides no protection of human health and environment and does not address site risks through the elimination, reduction, or control through treatment, engineering, or institutional controls of the source of the carcinogenic material exposure.

4.3.2 Alternative 2 - Soil/Vegetative Cap

4.3.2.1 Long-Term Effectiveness and Permanence

The containment features associated with this alternative would effectively reduce the mobility of asbestos by limiting emission and/or erosion of ACM. However, the soil/vegetative cap alternative does not reduce the toxicity or volume of the ACM, and, therefore, will require maintenance and monitoring over the long-term. In addition, the asbestos will still be available for transport by ground water; however, the mobility of asbestos in ground water is expected to be very low. The cap will require periodic inspection for signs of erosion, settlement or subsidence. Maintenance is limited to periodic mowing of the vegetation to prevent the establishment of deep-rooted vegetation or burrowing animals. Due to the lack of performance information, long-term performance is difficult to evaluate. Repair of a failed cap would pose no more risks or difficulty than initial installation. The cap would be maintained for a minimum of 30 years.

4.3.2.2 Reduction of Toxicity, Mobility or Volume Through Treatment

Alternative 2 does not result in a reduction of toxicity or volume of contamination through treatment, but achieves a reduction in contaminant mobility through containment measures. The threats of direct contact with ACM, and inhalation of fugitive dust emissions are mitigated. However, because the ground water saturates much of the ACM, the ACM remains as a continued potential source of ground water contamination, which is not contained by this alternative. Therefore, risks associated with future ground water contamination are not prevented, although future ground water quality impacts, if any, may be less than those posed by a no action alternative.

4.3.2.3 Short-Term Effectiveness

Short-term risks associated with this alternative include direct contact and/or inhalation of fugitive dusts during the grading and capping activities. Direct exposure by workers during system operation can be minimized through the use of appropriate safety equipment. Risks associated with inhalation of fugitive dusts are controllable through air monitoring, the use of appropriate health and safety equipment and dust suppression techniques. Air monitoring will also be used to identify potential off-site risks to the community. The time required to meet remedial response objectives is estimated to be six months.

4.3.2.4 Implementability

Technical Feasibility

A difficulty may arise in implementing this alternative due to the presence of the semi-liquid material that is present as part of the ACM. If the density of this material is significantly lower than of the other ACM and the cap, this material may move through the ACM and the cap due to buoyant forces. This could result in exposure of the ACM.

In addition, much of the ACM in the White Bridge Road and New Vernon Road properties are located in swampy area. This will pose some difficulties in the construction of the cap. The location of some or all of the ACM in the 100 year flood plains will also require special considerations in cap design and construction. In addition to possible density problems, subgrade preparation, unstable surface conditions, consolidation of the cap, cap integrity and potential problems with high water table will pose difficulties in implementing a capping alternative in some or all of the contaminated areas at the two properties.

The actual implementation of these activities will involve well-developed construction methods with few difficulties or technical problems anticipated. Implementation would not hinder future remedial activities.

Administrative Feasibility

No administrative coordination would be required prior to implementation.

Availability of Services and Materials

Availability of material, installation crews, or equipment could cause a limited (*i.e.* one or two month) delay in cap construction. Proper scheduling would minimize the potential for delays, however, since a number of suppliers and installers exist.

4.3.2.5 Cost

The costs associated with Alternative 2 include $1.1 million in direct capital costs, $0.1 million in indirect capital costs and $210,000 in annual operation and maintenance costs. The total present value of this alternative, including contingency and 30 years of operation and maintenance, is estimated at $1.7 million. A detailed cost estimate is presented in Appendix A. The cost of buying/placing the topsoil cover material, at $607,000 represents the major component of the total direct capital cost.

4.3.2.6 Compliance with ARARs

Alternative 2 is consistent with EPA Guidance (EPA, 1988b) which, for source control actions, prefers that an alternative be developed that involves containment of waste with little or no treatment, but protects human health and the environment by preventing potential exposure and/or by reducing contaminant mobility. Containment meets the goals of SARA because the technology reduces the mobility of the wastes.

It is believed that the proposed caps will encroach upon the wetland area. New construction in a wetland requires specific actions by the lead federal agency. These are discussed in the location specific ARARs/TBCs section. In addition, the properties are within the 100-year floodplain of the Passaic River. Therefore, the RCRA regulations (4 USC 6901), and the NJ Flood Hazard Area regulations (NJAC 7:2-11) which regulate construction within a floodplain are likely to affect cap construction.

The construction of the cap will minimize risks of potential exposure with ACM through direct contact, ingestion and inhalation through the reduction in contaminant mobility over the component's design life. However, this remedy does not eliminate contamination which already exists in the subsurface. In addition, institutional controls of the capped ares will be required to ensure effectiveness. Finally, the permanence of the cap must be in question because all or part of the ACM at both sites lie in the 100 year flood plain.

4.3.2.7 Overall Protection of Human Health and the Environment

This alternative partially protects human health and the environment through partial containment of contaminated materials. The alternative meets remedial action objectives. However, a contamination source remains for potential migration if the capped areas are not maintained.

4.3.3 Alternative 3 - ACM Excavation and Off-Site Vitrification

4.3.3.1 Long-Term Effectiveness and Permanence

This alternative would provide a permanent reduction in ACM. ACM will be transported off-site to a commercial vitrification system where the contaminants will be thermally destroyed. Long-term risks due to residual waste would be minor to non-existent.

Alternative 3 requires no long-term maintenance and monitoring of residuals upon completion of remediation.

4.3.3.2 Reduction of Toxicity, Mobility or Volume Through Treatment

Off-site vitrification of ACM would reduce the toxicity, mobility and volume of the ACM by thermally destroying the contaminant.

4.3.3.3 Short-Term Effectiveness

Soil excavation and offsite transportation will present significant short-term risks due to direct contact and/or inhalation of fugitive dusts. Direct exposure by workers during ACM excavation could be minimized through the use of appropriate safety equipment. Risks associated with inhalation of fugitive dusts during excavation can be controlled through air monitoring, the use of appropriate health and safety equipment, and dust suppression techniques. Air monitoring would also be used to identify potential off-site risks to the community. Inhalation of fugitive dusts during transportation of the contaminated soil would be controlled by transporting the soil in enclosed or covered containers. Assuming adequate controls during transportation, the greatest potential exposure for this alternative would be associated with workers within the boundary of the facility. Environmental impacts would be minimized through run-on/run-off controls and dust generation controls.

For Alternative 3, the time required to meet remedial response objectives will largely depend on the time required for ACM excavation. Excavation and transportation to the treatment facility is estimated at four months; at which time, it is anticipated that remedial response objectives will have been achieved. The total timeframe for completion of Alternative 3 is estimated at eight and one half months. This is the time required after completion of design.

4.3.3.4 Implementability

Technical Feasibility

Excavation technical problems would be expected to be minimal. It may be necessary to use special handling procedures during the removal of the semi-solid material that has been discovered as part of ACM. Off-site vitrification of ACM involves excavation of materials and shipment off-site to the proper facility. The actual implementation of these activities will involve well-developed construction/ transportation methods with few difficulties or technical problems anticipated. Implementation should not hamper future remedial activities. The fact that much of the ACM is present below the water table will facilitate the excavation of this material. Dust generation is expected to be minimal from excavation of these materials.

Administrative Feasibility

Implementation of Alternative 3 would require authorization for onsite discharging of extracted ground water collected as a result of site dewatering and subsequently discharged, as well as for excavation of ACM located within a 100 yr. floodplain.

Availability of Services and Materials

Excavation involves a well-developed technology with no shortage of equipment or experienced workers for implementation. As discussed earlier, the availability of the vitrification system is extremely limited due to the fact that it is a currently developing technology and there is only one known supplier and a limited number of existing systems. The lack of available systems could delay implementation of the technology.

4.3.3.5 Cost

The costs associated with Alternative 3 include $18.8 million in direct capital costs, and $1.7 million in indirect capital costs. Operation and maintenance of the ground water monitoring program for five years in estimated to total $43,000. The total cost of this alternative, including contingency, is estimated at $24.7 million. A detailed cost estimate is presented in Appendix A.

The cost of off-site ACM vitrification, at $16.0 million, represents 66 percent of the total cost.

4.3.3.6 Compliance with ARARs

The Excavation/Off-Site Vitrification Alternative would be effective in ensuring long-term compliance with ARARs, however, significant risk of exposure through airborne and surface water routes or direct contact may exist during remediation.

Excavation and construction activities could cause ARARs to be exceeded. Air quality could be greatly affected by airborne asbestos. The potential for non-compliance with ARARs exists during the time required for excavation and containerization of the asbestos. The large volume of asbestos containing material to be transported off-site increases the potential for release during transportation and disposal. Executive Order 11990 may require a waiver due to the properties being located within the 100-yr. floodplain of the Passaic River Basin. Based on discussions with the process vendor, it is anticipated that the vitrified product will be in compliance with chemical-specific ARARs for residual asbestos concentrations.

Off-site vitrification is expected to meet remedial action objectives. A permanent reduction in the toxicity, mobility and volume of existing contamination will have been achieved by the removal and offsite vitrification of ACM.

4.3.3.7 Overall Protection of Human Health and Environment

Alternative 3 provides control of risks posed by asbestos contamination through ACM excavation and off-site vitrification. The greatest short-term risks associated with this alternative are related to the emission of asbestos-containing dust during ACM excavation. Additional short-term risks are associated with ACM transport. The long-term effectiveness and permanence are expected to be good, with no long-term maintenance and monitoring. Overall, the alternative is expected to achieve cleanup levels. Short-term and cross-media impacts posed by the alternative are expected to be unacceptable.

4.3.4 Alternative 4 - In-Situ Stabilization/Solidification

4.3.4.1 Long-Term Effectiveness and Permanence

In-situ stabilization/solidification is expected to reduce the mobility of ACM at both properties and meet the remedial action objectives. Time needed to remediate the properties to meet the cleanup level is uncertain.

The long-term risks associated with in-situ solidification are primarily due to the potential leaching of asbestos from the treated matrix due to the contaminant having been encapsulated.

Upon completion of the remediation, limited long-term maintenance or monitoring will be associated with the solidified ACM.

4.3.4.2 Reduction of Toxicity, Mobility or Volume Through Treatment

Alternative 4 involves the fixation of ACM in a cement-based matrix. By immobilizing the ACM, the toxicity of the soil and the mobility of the contaminant will be significantly reduced. Immobilization of ACM in Alternative 4 will increase total mass of ACM. This increase in volume is expected to be approximately 10 percent (EPA 1991).

4.3.4.3 Short-Term Effectiveness

Short-term risks associated with this alternative include direct contact and/or inhalation of fugitive dusts during operation of the in-situ system. Direct exposure by workers during system operation can be minimized through the use of appropriate safety equipment. Risks associated with inhalation of fugitive dusts are controllable through air monitoring, the use of appropriate health and safety equipment and dust suppression techniques. Air monitoring will also be used to identify potential off-site risks to the community. Due to no excavation or transportation of contaminated soils being required under these alternatives, the risks to workers and the community are significantly less in the short-term compared to the alternative requiring excavation (Alternative 3).

For Alternative 4, the time required to meet remedial response objectives will depend greatly on the employed process operational parameters, which can not be determined at this time. It is anticipated that the in-situ stabilization/solidification system will, at a minimum, require ten months to complete stabilization of the ACM at both properties.

4.3.4.4 Implementability

Technical Feasibility

While the in-situ stabilization process is a relatively new system, it has been demonstrated at various sites so that implementation should provide limited technical problems. Implementation is not expected to limit future remedial actions or result in exposure pathways which are difficult to monitor.

While treatability studies would be required for this technology, technical problems are not anticipated due to the contaminant and soil characteristics involved, and the relatively shallow depths of the contamination.

EPA has contacted GEO-Con Inc. (EPA, 1991) in order to obtain information regarding the applicability of the in situ stabilization technique at the New Vernon Road and White Bridge Road properties. The results of this contact indicate that it will be necessary to perform treatability studies on the ACM at the properties. Treatability studies generally consider several solidification agents and can be performed in about 6 weeks. The resulting solidified masses are then evaluated for various physical and chemical characteristics and the results are then compared in order to select the preferred solidification agent.

The rate of treatment of the system is usually between 300 and 500 yd^3 per day with a volume increase of approximately 10 percent due to the solidification agency. The process can be performed near structures and is not expected to result in any geotechnical problems with structures in the vicinity of the treater material. High ground water tables at the site are not anticipated to be a problem as this process is effective above or below the water table (EPA 1991).

Administrative Feasibility

Alternative 4 would require little or no administrative coordination or authorization prior to implementation.

Availability of Services and Materials

Vendors supplying in-situ stabilization/solidification systems are somewhat limited. However, Geo-Con has several deepen mixing rigs and availability and scheduling is not anticipated to be a problem (EPA 1991). Implementation of the remedial alternative may be delayed until the in-situ system can be obtained.

4.3.4.5 Cost

The costs associated with Alternative 4 include $4.3 million in direct capital costs, $387,000 in indirect capital costs, and $43,400 in annual operation and maintenance costs for the five year ground water monitoring program. The total cost of this alternative, including contingency, is estimated at $5.7 million. A detailed cost estimate is presented in Appendix A.

4.3.4.6 Compliance with ARARs

The in-situ stabilization/solidification alternative would be effective in ensuring long-term compliance with ARARs. However, risks of exposure through airborne and surface water routes or direct contact may exist during remediation. Mixing of waste may cause exceedance of chemical-specific ARARs. Location-specific ARARs must also be considered during alternative implementation due to the properties location within the 100-year floodplain of the Passaic River Basin. In-situ stabilization/solidification is expected to provide a reduction in the mobility of existing contamination, per SARA preference.

This alternative is expected to meet remedial action objectives by reducing the toxicity of contaminated soils and the mobility of ACM.

4.3.4.7 Overall Protection of Human Health and Environment

Alternative 4 provides control of risks posed by asbestos contamination through stabilization/solidification of ACM. Short-term risks include potential direct contact of contaminated materials by site workers and the generation/inhalation of asbestos-containing fugitive dust. The long-term effectiveness and permanence are expected to be good, with little long-term maintenance and monitoring. Because of the in-situ nature of the alternative, however, there is a greater potential for untreated wastes or residuals within the treatment zone to remain. Overall, the alternative is expected to attain remedial action objectives. Short-term and cross-media impacts posed by the alternatives are expected to be acceptable.

4.3.5 Alternative 5 - ACM Excavation and Off-Site Landfill Disposal

4.3.5.1 Long-Term Effectiveness and Permanence

This alternative would provide for removal of ACM from the site. ACM will be transported off-site to a commercial landfill where the contaminants will be disposed of in such a way as to minimize the likelihood of future exposure. Long term residual risks due to residual asbestos would be minor.

Alternative 5 requires no long-term maintenance and monitoring of residuals upon completion of remediation.

4.3.5.2 Reduction of Toxicity, Mobility or Volume Through Treatment

This alternative does not reduce the toxicity or volume of the ACM, however the long-term mobility of asbestos would be reduced.

4.3.5.3 Short-Term Effectiveness

Soil excavation and offsite transportation will present significant short-term risks due to direct contact and/or inhalation of fugitive dusts. Direct exposure by workers during ACM excavation could be minimized through the use of appropriate safety equipment. Risks associated with inhalation of fugitive dusts during excavation can be controlled through air monitoring, the use of appropriate health and safety equipment, and dust suppression techniques. Air monitoring would also be used to identify potential off-site risks to the community. Inhalation of fugitive dusts during transportation of the contaminated soil would be controlled by bagging the ACM before transport. The greatest potential exposure for this alternative would be associated with workers within the boundary of the facility. Environmental impacts would be minimized through run-on/run-off controls and dust generation controls.

For Alternative 5, the time required to meet remedial response objectives will largely depend on the time required for ACM excavation. Excavation and transportation to the landfill is estimated at five months; at which time, it is anticipated that remedial response objectives will have been achieved. The total timeframe for completion of Alternative 5 is estimated at nine and one-half months.

4.3.5.4 Implementability

Technical Feasibility

Technical problems associated with excavation would be expected to be minimal. It may be necessary to use special handling procedures during the removal of the semi-solid material that has been discovered as part of ACM. Off-site landfilling ACM involves the excavation and bulk packaging of materials and shipment off-site to the proper facility. Most of the actual implementation of these activities will involve well-developed construction/ transportation methods with few difficulties or technical problems anticipated. Methods for bulk containerization of the processed ACM may require some additional development. Implementation should not hamper future remedial activities.

Administrative Feasibility

Implementation of Alternative 5 would require authorization for onsite discharging of extracted ground water and excavation of ACM located within a 100 yr. floodplain.

Availability of Services and Materials

Excavation involves a well-developed technology with no shortage of equipment or experienced workers for implementation. The landfill disposal costs are based on disposal of the ACM at the Grand Central Sanitation Inc. landfill located in Pen Argyl PA.

4.3.5.5 Cost

The costs associated with Alternative 5 include $12.2 million in direct capital costs, and $1.1 million in indirect capital costs. Operation and maintenance of the ground water monitoring program for five years in estimated to total $43,000. The total cost of this alternative, including contingency, is estimated at $16.0 million. A detailed cost estimate is presented in Appendix A.

The cost of off-site landfilling, at $3 million, represents 5 percent of the total cost.

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4.3.5.6 Compliance with ARARs

The Excavation/Off-Site Landfill Alternative would be effective in ensuring long-term compliance with ARARs, however, significant risk of exposure through airborne and surface water routes or direct contact may exist during remediation. Excavation and construction activities could cause ARARs to be exceeded. Air quality could be greatly affected by airborne asbestos. The potential for non-compliance with ARARs exists during the time required for excavation and containerization of the asbestos. The large volume of asbestos containing material to be transported off-site increases the potential for release during transportation and disposal. A waiver may be required for location-specific ARARs due to the properties being located within the 100-yr. floodplain of the Passaic River Basin. The landfilling of ACM will be in compliance with chemical-specific ARARs for disposal of ACM.

4.3.5.7 Overall Protection of Human Health and Environment

Alternative 5 provides control of risks posed by asbestos contamination through ACM excavation and off-site landfilling. The greatest short-term risks associated with this alternative related to the emission of asbestos-containing dust during ACM excavation. Additional short-term risks are associated with ACM transport. The long-term effectiveness and permanence are expected to be good, with no long-term maintenance and monitoring required at the site. Overall, the alternative is expected to achieve cleanup levels. Short-term and cross-media impacts posed by the alternative are expected to be significant.

4.4 Comparative Analysis of Alternatives

In this section, the strengths and weaknesses of the alternatives relative to one another are discussed for each of the analysis criteria. In each discussion, the alternative which provides the best overall performance in that category is discussed first, followed by the other alternatives discussed in the relative order in which they perform. These comparisons of alternatives are also presented in summary form in Tables 4-3 through 4-9.

4.4.1 Long-Term Effectiveness and Permanence

The alternative which poses the least residual risk due to untreated waste or treatment residues, or the greatest capability for controlling these risks, is considered to provide the greatest long-term effectiveness and permanence.

Alternatives 3 and 5 will provide the greatest long-term effectiveness and permanence since material is transported offsite for treatment, requiring no on-site residual management. However, Alternative 5 will require long-term off site residual management. Alternative 3 is the only alternative which will provide a permanent

TABLE 4-3. COMPARISON AMONG ALTERNATIVES LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternative 1:	No action	Baseline risks remain unchanged.
Alternative 2:	Soil/vegetative cap	Contaminants are untreated but contained; long-term monitoring of containment area required; risks associated with potential ground water contamination not addressed.
Alternative 3:	ACM excavation and off-site vitrification	Contaminants are treated off-site; long-term risks are low relative to Alternatives 1, 2 or 4.
Alternative 4:	In-situ soil stabilization/solidification	Contaminants treated without excavation; potential long-term risks are low relative to Alternatives 1 or 2.
Alternative 5:	ACM excavation and off-site landfill	Contaminants are untreated but contained off-site; long-term risks are the same as Alternative 3 assuming proper landfill O&M.

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TABLE 4-4. COMPARISON AMONG ALTERNATIVES REDUCTION OF TOXICITY (T), MOBILITY (M), OR VOLUME (V) THROUGH TREATMENT

Alternative 1:	No action	No reductions in T, M, or V; site conditions remain unchanged.
Alternative 2:	Soil/vegetative cap	No reductions in T or V (M of asbestos is decreased through containment, but not to the same degree as Alternatives 3 and 4).
Alternative 3:	ACM excavation and off-site vitrification	Reduced overall T, M and V of contaminant, although short-term potential M of contaminant increases due to excavation.
Alternative 4:	In-situ stabilization/solidification	Reduced M of contaminant; reduced T of soils; increased V of stabilized mass.
Alternative 5:	ACM excavation and off-site landfill	No reduction in T or V; short-term increase in M; long-term decrease in M.

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TABLE 4-5. COMPARISON AMONG ALTERNATIVES SHORT-TERM EFFECTIVENESS

Alternative 1:	No action	Basceline risks remain unchanged; remedial response objectives not achieved.
Alternative 2:	Soil/vegetative cap	Risks to remediation workers may occur during cap construction due to surface soil contamination, but is significantly lower than Alternatives 3 or 5; remedial response objectives could potentially be achieved in 6 months.
Alternative 3:	ACM excavation and off-site vitrification	Health and safety factors[1] exist during remediation; Alternatives 3 and 5 would potentially pose greatest short-term respiratory risks due to excavation; remedial response objectives achieved within 7 months.
Alternative 4:	In-situ soil stabilization/solidification	Health and safety factors[1] exist during remediation, in-situ immobilization could potentially pose short-term respiratory risks but risks are more controllable than with Alternative 3 and 5; remedial response objectives potentially achieved within 10 months.
Alternative 5:	ACM excavation and off-site landfill	Health and safety factors[1] exist during remediation; short term respiratory risks due to excavation are greater than Alternatives 1, 2 and 4; Remedial Response Objectives achieved within 8 months.

[1]Health and safety factors include potential inhalation/contact/ingestion of asbestos fibers.

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TABLE 4-6. COMPARISON AMONG ALTERNATIVES IMPLEMENTABILITY

Alter-native	Description of Alternative	Technical Feasibility	Administrative Feasibility	Availability of Services and Materials
1:	No action	No implementation required	No administrative coordination needed	No implementation required
2:	Soil/vegetative cap	Construction easily implemented; some complications due to wetlands soils	No administrative coordination needed	Suppliers of services and cap equipment readily available; could inhibit future remediation
3:	Soil/ACM excavation and off-site vitrification	Readily implemented; Will require a treatability study.	Requires authorization for onsite discharging of extracted ground water and excavation within a 100 year floodplain	Process vendors very limited; availability could be a problem
4:	In-situ stabilization/ solidification	Fairly easily implemented; technical problems possible; due to in-situ nature of treatment, monitoring of completeness of treatment hindered. Treatability study required.	Little or no administrative coordination would be required prior to implementation	Availability of process of somewhat limited
5:	ACM excavation and offsite landfill	Readily implemented	No administrative coordination needed	Offsite disposal facility readily available.

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TABLE 4-7. COMPARISON AMONG ALTERNATIVES COST

		Total Capital Cost	Total Net Present Value Annual O&M Cost	Total Present Worth[1]
Alternative 1:	No action	-	-	-
Alternative 2:	Clay/vegetative cap	1,212,000	211,000	1,707,000
Alternative 3:	ACM excavation and off-site vitrification	20,505,000	43,000	24,658,000
Alternative 4:	In-situ stabilization/solidification	4,691,000	43,300	5,682,000
Alternative 5:	ACM excavation and off-site landfill	13,295,000	43,300	16,006,000

[1]Includes 20% contingency. See Appendix A for detailed cost estimates.

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TABLE 4-8. COMPARISON AMONG ALTERNATIVES COMPLIANCE WITH ARARS

Alternative 1:	No action	Minimum compliance with location and chemical-specific ARARs. Not consistent with SARA preference for permanent solutions.
Alternative 2:	Soil/vegetative cap	Consistent with SARA preference for reductions in contaminant mobility. May not comply with location-specific ARARs
Alternative 3:	ACM excavation and off-site vitrification	Compliance with action-specific ARARs. Consistent with SARA preference for permanent solutions and reductions in mobility; toxicity and volume. May not comply with location specific ARARs and may exceed threshold unit values during excavation.
Alternative 4:	In-situ stabilization/solidification	Consistent with SARA preference for permanent solutions and reductions in mobility; compliance with action-specific ARARs. Chemical-specific ARARs will be met in the long term. Alternative may not comply with location-specific ARARs.
Alternative 5:	ACM excavation and off-site landfill	Consistent with SARA preference for reductions in contaminant mobility. May temporarily exceed threshold limit values during excavation.

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TABLE 4-9. COMPARISON AMONG ALTERNATIVES OVERALL PROTECTIVENESS OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative 1:	No action	Baseline risks remain unchanged.
Alternative 2:	Soil/vegetative cap	Provides some containment but risks associated with potential future ground water contamination not addressed; approaches but does not attain cleanup levels.
Alternative 3:	ACM excavation and off-site vitrification	Contaminants treated off-site; potential for increased short-term risks due to soil excavation; exceeds cleanup levels.
Alternative 4:	In-situ stabilization/solidification	Contaminants treated in situ; short-term risks are greater than alternatives 1 and 2, but lower than alternative 3 and 5 due to no excavation; could potentially attain cleanup levels.
Alternative 5:	ACM excavation and off-site landfill	Provides containment, potential for increased short-term risks due to soil excavation.

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elimination of the health risks posed by asbestos on the site. This is because the crystaline structure of the mineral is modified to the extent where it no longer poses a health hazard. Alternative 4 provides treatment of ACM on-site, thereby increasing the potential risks associated with the on-site handling of residuals. Although less permanent then Alternative 3, Alternative 4 is more permanent then capping because no maintenance is required for the stabilized mass. The overall reduction in site risk achieved by Alternative 3 may exceed other alternatives. Alternative 4 will reduce the long term mobility of the ACM significantly by incorporating the ACM into an immobile mass. This mass should be resistant to airborne emission of asbestos longer then any alternative other then Alternative 3. Alternative 2 reduces risk through its containment features, but requires long-term monitoring. Alternative 1, the no action alternative, offers no long-term effectiveness or permanence.

4.4.2 Reduction of Toxicity, Mobility or Volume Through Treatment

Alternative 3 provides reduction of toxicity, mobility and volume through treatment of ACM. Vitrification of ACM offers a very high degree of toxicity and overall mobility reduction. However, Alternative 3 along with Alternative 5 permits the greatest increase in short-term mobility due to excavation. Alternative 4 provides a reduction in soil toxicity through immobilization of contaminants, with minor short-term risks posed by limited handling of ACM. The toxicity of the asbestos is not reduced, as it is in Alternative 3, but the toxicity of the matrix is significantly reduced due to binding ACM in a solidified mass. Treatment by in-situ stabilization/solidification will increase the volume of the initial untreated materials.

Although it is less effective then 3, 4, and 5, in Alternative 2, the mobility of ACM is reduced through containment measures. No reduction in ACM toxicity or volume is obtained.

Alternative 1, no action, provides no reduction in toxicity, mobility or volume of ACM.

4.4.3 Short-Term Effectiveness

Alternatives which provide short-term achievement of remedial response objectives while minimizing short-term risks are considered to be the most effective. In general, alternatives which require soil excavation create the greatest short-term risks due to the emission of fugitive dusts containing asbestos fibers.

Alternative 2 provides the greatest overall short-term effectiveness. This alternative involves no excavation or mixing of wastes, thereby limiting short-term risks to on-site workers. Remedial response objectives could potentially be achieved even though remediation of ACM is not addressed. Alternative 2 will require long-term maintenance in order to eliminate release of ACM from the site.

Alternative 4 involves short-term risks associated with the in-situ mixing if contaminated materials with chemical additives and fixing agents. This risk, however, is expected to be significantly less than the short-term risk posed by Alternatives 3 and 5 which includes ACM excavation. Remedial action objectives will be achieved by this alternative.

Alternatives 3 and 5 offers achievement of remedial response objectives within an estimated timeframe of seven and eight months respectively, but involves the greatest short-term risks of all the alternatives due to ACM excavation.

Alternative 1, the no action alternative, provides minimal short-term direct exposure risks, but baseline risks are unchanged. Remedial response objectives are not achieved by this alternative.

4.4.4 Implementability

Those alternatives which offer the greatest technical feasibility, administrative feasibility, and service and material availability are considered to be most implementable. This can be offset, however, by the availability of off-site services. Typically those alternatives which involve the most-readily available treatment/containment methods are more easily implemented.

Alternative 1, the no action alternative, is the most implementable because it actually requires no implementation of remedial measures.

Alternative 2 follows Alternative 1 in implementability. As previously stated, some technical difficulties are expected resulting from capping in a wetland/flood plain. However, capping construction methods are well developed and easily implemented.

Some limited difficulties in the implementation of Alternative 5 is expected because excavation of ACM may pose some problems.

Alternative 4 will require a treatability study to determine the technology's effectiveness with the ACM. No site specific factors have been identified that would preclude its use at the properties.

Alternative 3 is considered the least implementable alternative because process vendors are extremely limited.

All active remedial alternatives will effect activities at the residences and businesses located on the properties. Alternatives involving excavation are expected to be the most disruptive. This is because of the large amount of time required to excavate and handle the ACM at the properties as well as constructing and moving excavation enclosure. The capping and solidification stabilization would be less disruptive to activities on the properties.

The distribution of contamination at the New Vernon Road property is such that limited impact on business activities on the site would be expected. However, it will be necessary to tear up the paved driveway leading to the garage.

At the White Bridge Road site most remedial activities will occur in the vicinity of the riding track. Thus, most of the estimated time to remediate will be spent in this area.

4.4.5 Cost

A comprehensive analysis of present worth cost of the alternatives is presented below, followed by a cost sensitivity analysis. Due to their close proximities and similar characteristics, cost estimates for remedial action at White Bridge and New Vernon Road were calculated together to obtain one cost estimate for each alternative. If necessary, a detailed, property-specific cost estimate for each alternative can be prepared.

4.4.5.1 Present Worth Comparative Analysis

As previously presented in Table 4-7, present worth cost estimates for alternative implementation range from $0 to $24.7 million.

The lowest cost alternative is the no action alternative. Because no activities would be associated with this alternative, it has no present worth cost associated with its implementation.

Alternative 2 can be implemented at a present worth cost of $1.7 million. This cost is the least expensive of the alternatives involving remedial action. Alternative 4 is the next lowest with a present worth cost of $5.7 million. The in-situ nature of the alternative minimizes material handling costs. Alternative 5 follows with a present worth cost of $15.5 million.

Alternative 3 can be implemented at a total cost of $24.7 million with off-site vitrification, a direct cost, as the major cost component.

4.4.5.2 Sensitivity Analysis

A sensitivity analysis was conducted to assess the effect that variations in specific assumptions made during alternative development and assessment can have on the estimated remedial cost. Remediation alternatives are impacted by uncertainties regarding discount factors over the life of the remedies, treatment costs, and ACM volumes.

The discount rate can vary from the 10 percent rate used in the cost evaluation (per the Remedial Action Costing Procedures Manual, JRB Associates, 1987). Alternatives with large O&M cost components can be significantly impacted by these costs. The sensitivity analysis has been conducted assuming annual discount rates of 5 percent and 15 percent.

Treatment cost uncertainties are largely due to site-specific impacts on vendor quotes. As such, the level of development and demonstrated realism of cost estimates provided by vendors comes into play. The sensitivity analysis has assumed treatment costs vary by ± 40 percent.

ACM volume estimates are approximate. The sensitivity analysis has been performed assuming ACM volume estimates could vary ± 30 percent.

The results of the sensitivity analysis are presented in Table 4-10.

As illustrated in Table 4-10 data, Alternative 2 contaminant costs vary the least of all alternatives except no action. Of the alternatives, including treatment/disposal, Alternative 4, in-situ stabilization/solidification, is the least affected by uncertainties considered in this sensitivity analysis.

4.4.6 Compliance with ARARs

Those alternatives which offer the greatest overall compliance with potential chemical-specific, location-specific and action-specific ARARs are considered to offer the best performance under this criterion. Location-specific ARARs will impact the implementation of alternatives at the properties. The wetland area north of the New Vernon Road property and the 100-year floodplain of the Passaic River Basin on the properties must be considered during remediation. Alternatives have been designed to meet potential action-specific ARARs, therefore, for the most part, attainment of potential chemical-specific ARARs and compliance with other criteria, advisories and guidance (*e.g.*, SARA) guide to comparative analysis of alternatives.

Alternatives 2, 3, 4 and 5 are considered to attain ARARs in the long term. They are consistent with SARA's preference for alternatives which provide a permanent solution and reductions in mobility, toxicity or volume. However, alternatives 3 and 5 may not be in compliance with ARARs during excavation and/or mixing of ACM. Alternative 2 may not be in compliance with ARARs during cap construction.

The no action alternative, Alternative 1, does not attain ARARs.

All remedial alternatives may exceed acceptable airborne asbestos concentrations at some point in their implementation.

TABLE 4-10. COST SENSITIVITY ANALYSIS

Item Varied (Minimum - Maximum)	Alternative	Cost Range (1991 Dollars)
Discount Factor (± 5 percent)		
	2: capping	1,632,000-1,869,000
	3: vitrification	24,652,000-24,665,000
	4: stabilization	5,676,000-5,688,000
	5: landfill	16,000,000-16,013,000
Cost of Treatment of ACM (± 40 percent)	3: vitrification	16,313,000-33,003,000
	4: stabilization	3,688,000-7,829,000
	5: landfill	14,435,000-17,577,000
Volume of ACM (± 30 percent)		
	2: capping	1,291,000-2,124,000
	3: vitrification	17,232,000-31,322,000
	4: stabilization	4,135,000-7,381,000
	5: landfill	10,934,000-20,070,000

4.4.7 Overall Protection of Human Health and Environment

This criterion considers the previous criteria, especially long-term effectiveness and permanence, short-term effectiveness, and achievement/exceedance of cleanup levels, and provides a final overall assessment of whether the alternative provides adequate protection of human health and the environment.

Alternatives 3 and 5 are expected to exceed cleanup levels, but involves ACM excavation, which may present short-term risks due to fugitive dust emissions. Alternative 4 could potentially attain cleanup levels without excavation of waste materials, but short-term risks although reduced due to the in-situ nature of the remedy still exist due to ACM disturbance during the in-situ process. This risk is expected to be significantly less than Alternatives 3 and 5.

Alternative 2 does not achieve cleanup levels, but could satisfy remedial action objectives. Alternative 2 poses the least amount of risk to human health and the environment by not excavating or mixing waste material. Alternative 2 includes some risks due to capping in a flood plain. Alternative 2 is also not consistent with the SARA preference for treatment and permanent remedies. Potential risks due to the migration of asbestos into ground water still exists due to the contaminant being contained, rather than treated.

Alternative 1, the no action alternative, is the least protective of human health and the environment.

REFERENCES

Alliance, 1991a, Final Focused Remedial Investigation Report for the White Bridge Road Site, Meyersville, New Jersey. Prepared by Alliance Technologies Corporation, June 10, 1991.

Alliance, 1991b, Final Focused Remedial Investigation Report for the New Vernon Road Site, Meyersville, New Jersey. Prepared by Alliance Technologies Corporation, June 10, 1991.

Fuller, Wallace H., 1977, Movement of Selected Metals, Asbestos and Cyanide in Soil: Applications to Waste Disposal Problems. Department of Soils, Water and Engineering. The University of Arizona, Tucson, Arizona, April 1977.

Hart, F.C., 1987, Draft Remedial Investigation Report Asbestos Disposal Sites Morris County, New Jersey. May 29, 1987.

NJDEP, 1989, ARARs Handbook.

National Research Council. 1984. Asbestos Form Fibers Non-Occupational Health Risk. National Academy Press, Washington, DC.

Transamerica, 1991, Flood Hazard Certification. Certification Numbers 19910604MA0028 and 1991 0604MA0027. Dated June 5, 1991.

U.S. EPA, 1980, Ambient Water Quality Criteria: 45FR 79318-79379, November 28, 1980.

U.S. EPA, 1986, National Primary Drinking Water Regulations, Final Rule Amendments to SDWA.

U.S. EPA, 1987, Superfund Program, Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements: Notice of Guidance, August 27, 1987.

U.S. EPA, 1988a, Drinking Water Regulations and Health Advisories: U.S. EPA Office of Drinking Water, December 1988.

U.S. EPA, 1988b, Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, OSWER Directive 9335.3-01. EPA/540/6-89/004. Office of Emergency and Remedial Response, August 8, 1988.

U.S. EPA, Remedial Action at Waste Disposal Sites (Revised): No. EPA/625/6-85/006, 1985.

U.S. EPA, 1988c, CERCLA Compliance with Other Laws Manual, Interim Final, EPA/540/E-89/006, Office of Emergency and Remedial Response, August 1988.

ABD 001 1692

U.S. EPA, 1990, International Waste Technologies/Geo Con In-situ Stabilization/Solidification, Applications Analysis Report. EPA/540/A5-89/004. August 1990.

EPA, 1991a. Personal Communication between Mr. James Doherty, Alliance Technologies Corporation and Mr. Brian Jaspersen, Geo-Con Inc. May 31, 1991.

EPA, 1991b. Risk Assessment Airborne Asbestos New Vernon Road and White Bridge Road Sites, Morris County, New Jersey. Prepared by U.S. EPA, Region II, March 1991.

EPA, 1991c. Personal Communication between Mr. John Deline, Alliance Technologies Corporations and Mr. Jeffery Newton, International Waste Technologies, June 3, 1991.

Vitrifix of North America Inc., 1991. Personal Communication between Mr. Brian Schmoyer, Alliance Technologies Corporation, and Mr. David Roberts of Vitrifix of North America. March 1991.

APPENDIX A

COST ESTIMATION WORKSHEETS

White Bridge Road/New Vernon Road Properties - Alternative 2:
Soil/Vegetative Cap

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
CAPITAL COSTS - DIRECT									
Site Fencing									
-Chain-link Fence	8145 ln. ft.	$13.50	1990	1	1.02	$13.77	$112,156.65		
-Warning signs	20 items	$32.00	1990	1	1.02	$32.64	$652.80		
Total Site Fencing									$112,809
Air Monitoring									
-OVA	6 months	$1,632.00	1990	2	1.02	$1,664.64	$9,987.84		
-HNu meter	6 months	$1,236.00	1990	2	1.02	$1,260.72	$7,564.32		
-Oxygen/Comb. Gas Meter	6 months	$248.00	1990	2	1.02	$252.96	$1,517.76		
-RAM	6 months	$1,236.00	1990	2	1.02	$1,260.72	$7,564.32		
-FAM	6 months	$1,236.00	1990	2	1.02	$1,260.72	$7,564.32		
Total Air Monitoring Costs									$34,199
Equipment Decontamination									
-Rental of steam cleaner	6 months	$390.00	1990	1	1.02	$397.80	$2,386.80		
-Decontamination pad	1 item	$500.00	1991	3	1.00	$500.00	$500.00		
-Wastewater disposal	20 drums	$135.00	1991	1	1.02	$137.70	$2,754.00		
Total Equipment Decon Costs									$5,641
Engineering Mgmt. Mob/Demob (1 trailer)	6 months	$400.00	1990	1	1.02	$408.00	$2,448.00		
Runon/Runoff Controls									
-Diversion Berm (1492 yd.x 1.0 yd.x 1.3 yd.)	1940 cu.yd.	$3.41	1990	1	1.02	$3.48	$6,747.71		
Total Runon/Runoff Controls									$6,748

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
Cap Construction									
-Mobil./Demob.	1 time	$240.00	1990	1	1.02	$244.80	$244.80		
-2 ft. topsoil (buy, load, spread)	35,400 cu. yd.	$16.80	1990	1	1.02	$17.14	$606,614.40		
-Haul	35,400 cu. yd.	$2.99	1990	1	1.02	$3.05	$107,962.92		
-Grading	50,700 sq. yd.	$0.52	1990	1	1.02	$0.53	$26,891.28		
-Plastic Netting	50,700 sq. yd.	$0.62	1990	1	1.02	$0.63	$32,062.68		
-Seeding/Revegetation	10.5 acres	$1,200.00	1985	4	1.14	$1,368.00	$14,364.00		
-Health and Safety(19%)				6			$149,700.10		
Total Cap Construction Costs									$937,840
Groundwater Wells									
-Mob./Demob.	2 item	$500.00	1990	1	1.02	$510.00	$1,020.00		
-Drill Rig and Crew	3 days	$1,200.00	1990	1	1.02	$1,224.00	$3,672.00		
-Drilling (8 wells, 20 ft.)	160 ln. ft.	$20.00	1990	1	1.02	$20.40	$3,264.00		
-PVC piping	160 ln. ft.	$2.52	1991	1	1.02	$2.57	$411.26		
-Risers	8 items	$125.00	1991	3	1.00	$125.00	$1,000.00		
-Screens	8 items	$125.00	1991	3	1.00	$125.00	$1,000.00		
-Grout	16 bags	$35.00	1991	3	1.00	$35.00	$560.00		
-Bentonite	2 bags	$25.00	1991	3	1.00	$25.00	$50.00		
-Lock Box	8 items	$150.00	1991	3	1.00	$150.00	$1,200.00		
Total Groundwater Well Installation Costs									$12,177
Direct Capital Cost Subtotal									$1,111,862
CAPITAL COSTS - INDIRECT									
Engineering and Design(6%)				5					$66,712
Legal and Administrative(3%)				5					$33,356
TOTAL CAPITAL COSTS									$1,211,930

Item	Quantity	Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
OPERATION AND MAINTENANCE COSTS										
-Cap Maintenance										
Inspection	4	times	$500.00	1987	6	1.08	$540.00	$2,160.00	30	$20,304
Mowing/Revegetation	10.5	acres	$600.00	1987	6	1.08	$648.00	$6,804.00	30	$63,958
Erosion Control	10.5	acres	$200.00	1987	6	1.08	$216.00	$2,268.00	30	$21,319
-Groundwater Sampling										
Sampling Labor	16	hours	$50.00	1991	3	1.00	$50.00	$800.00	30	$7,520
Asbestos analyses	32	samples	$200.00	1991	3	1.00	$200.00	$6,400.00	30	$60,160
Reporting (Quarterly)	4	each	$1,000.00	1991	3	1.00	$1,000.00	$4,000.00	30	$37,600
TOTAL NET PRESENT VALUE OF O & M										$210,861
SUBTOTAL										$1,422,790
CONTINGENCY(20%)										$284,558
TOTAL PRESENT VALUE COST FOR ALTERNATIVE 2										$1,707,348

White Bridge Road/New Vernon Road Properties - Alternative 3:
ACM Excavation with Off-Site Vitrification

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
CAPITAL COSTS - DIRECT									
Site Fencing									
-Chain-link Fence	8145 ln. ft.	$13.50	1990	1	1.02	$13.77	$112,156.65		
-Warning signs	20 items	$32.00	1990	1	1.02	$32.64	$652.80		
Total Site Fencing Costs									$112,809
Air Monitoring									
-OVA	8.5 months	$1,632.00	1990	2	1.02	$1,664.64	$14,149.44		
-HNu meter	8.5 months	$1,236.00	1990	2	1.02	$1,260.72	$10,716.12		
-Oxygen/Comb. Gas Meter	8.5 months	$248.00	1990	2	1.02	$252.96	$2,150.16		
-RAM	8.5 months	$1,236.00	1990	2	1.02	$1,260.72	$10,716.12		
-FAM	8.5 months	$1,236.00	1990	2	1.02	$1,260.72	$10,716.12		
Total Air Monitoring Costs									$48,448
Equipment Decontamination									
-Rental of steam cleaner	8.5 months	$390.00	1990	1	1.02	$397.80	$3,381.30		
-Decontamination pad	1 item	$500.00	1991	3	1.00	$500.00	$500.00		
-Wastewater disposal	100 drums	$135.00	1990	1	1.02	$137.70	$13,770.00		
Total Equipment Decon Costs									$17,651
Engineering Mgmt. Mob/Demob (1 trailer)	8.5 months	$400.00	1990	1	1.02	$408.00	$3,468.00		
Runon/Runoff Controls									
-Diversion Berm (1492 yd.x 1.0 yd.x 1.3 yd.)	1940 cu.yd.	$3.41	1990	1	1.02	$3.48	$6,747.71		
Total Runon/Runoff Controls									$6,748

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
Collection Trench									
-Excavation (1800 ln. ft.)	17,000 cu.yd.	$3.55	1990	1	1.02	$3.62	$61,557.00		
-Gravel (Buy, load, and fill)	17,000 cu.yd.	$8.15	1990	1	1.02	$8.31	$141,321.00		
-Haul	17,000 cu.yd.	$2.99	1990	1	1.02	$3.05	$51,846.60		
-Collection/Discharge Equipment	185 days	$445.00	1990	1	1.02	$453.90	$83,971.50		
Total Collection Trench Construction Costs									$338,696
ACM Excavation									
-Mobil./Demobil.	1 time	$880.00	1990	1	1.02	$897.60	$897.60		
-Surveying	1 day	$960.00	1990	1	1.02	$979.20	$979.20		
-Excavation With Backhoe (2-1.0 cy backhoes)	37,530 cu.yd.	$3.55	1990	1	1.02	$3.62	$135,896.13		
-Health and Safety(237%)				6			$322,073.83		
-Rental of Enclosed Containers	1,250 boxes	$275.00	1990	1	1.02	$280.50	$350,625.00		
-ACM Transportation	1,250 rd. trip	$750.00	1991	3	1.00	$750.00	$937,500.00		
-Off-site Vitrification	37,530 cu.yd.	$425.00	1991	7	1.00	$425.00	$15,950,250.00		
Containment Structure									
-lease cost	37,655 sq. ft.	$5.50	1991	11	1.00	$5.50	$207,102.50		
-construction and removal	2 times	$19,880.00	1990	11	1.02	$20,277.60	$40,555.20		
-shipping	2 times	$6,000.00	1991	11	1.00	$6,000.00	$12,000.00		
-moving costs									
-crane rental and crew	78 days	$634.00	1990	11	1.02	$646.68	$50,441.04		
-labor	1040 hours	$26.05	1990	11	1.02	$26.57	$27,633.84		
-exhaust air emissions control	3 units	$2,475.00	1990	11	1.02	$2,524.50	$7,573.50		
Total Excavation Costs									$18,043,528
Confirmation Sampling									
-Sampling Labor	8 hours	$50.00	1991	3	1.00	$50.00	$400.00		
-Asbestos Analysis	140 samples	$200.00	1991	3	1.00	$200.00	$28,000.00		
-Sampling Equipment	1 item	$500.00	1991	3	1.00	$500.00	$500.00		
Total Confirmation Sampling Costs									$28,900

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
Site Restoration									
-Mob./Demob.	1 time	$240.00	1990	1	1.02	$244.80	$244.80		
-Fill (Buy, Load and Spread)	20,530 cu.yd.	$7.55	1990	1	1.02	$7.70	$158,101.53		
-Grading	50,820 sq.yd.	$0.52	1990	1	1.02	$0.53	$26,954.93		
-Seeding/Revegetation	10.5 acres	$1,200.00	1985	4	1.14	$1,368.00	$14,364.00		
Total Site Restoration Costs									$199,665
Groundwater Wells									
-Mob./Demob.	2 item	$500.00	1990	1	1.02	$510.00	$1,020.00		
-Drill Rig and Crew	3 days	$1,200.00	1990	1	1.02	$1,224.00	$3,672.00		
-Drilling (8 wells, 20 ft.)	160 ln. ft.	$20.00	1990	1	1.02	$20.40	$3,264.00		
-PVC piping	160 ln. ft.	$2.52	1990	1	1.02	$2.57	$411.26		
-Risers	8 items	$125.00	1990	3	1.02	$127.50	$1,020.00		
-Screens	8 items	$125.00	1990	3	1.02	$127.50	$1,020.00		
-Grout	16 bags	$35.00	1990	3	1.02	$35.70	$571.20		
-Bentonite	2 bags	$25.00	1990	3	1.02	$25.50	$51.00		
-Lock Box	8 items	$150.00	1990	3	1.02	$153.00	$1,224.00		
Total Groundwater Well Installation Costs									$12,253
Direct Capital Cost Subtotal									$18,812,167
CAPITAL COSTS - INDIRECT									
Engineering and Design(6%)				5					$1,128,730
Legal and Administrative(3%)				5					$564,365
TOTAL CAPITAL COSTS									$20,505,262

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
OPERATION AND MAINTENANCE COSTS									
-Groundwater Sampling									
Sampling Labor	16 hours	$50.00	1990	3	1.02	$51.00	$816.00	5	$3,101
Asbestos analyses	32 sample	$200.00	1990	3	1.02	$204.00	$6,528.00	5	$24,806
Reporting (Quarterly)	4 each	$1,000.00	1990	3	1.02	$1,020.00	$4,080.00	5	$15,504
TOTAL NET PRESENT VALUE OF O & M									$43,411
SUBTOTAL									$20,548,673
CONTINGENCY(20%)									$4,109,735
TOTAL PRESENT VALUE COST FOR ALTERNATIVE 3									$24,658,408

White Bridge Road/New Vernon Road Properties - Alternative 4:
In-Situ Stabilization/Solidification

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
CAPITAL COSTS - DIRECT									
Site Fencing									
-Chain-link Fence	8145 ln. ft.	$13.50	1990	1	1.02	$13.77	$112,156.65		
-Warning signs	20 items	$32.00	1990	1	1.02	$32.64	$652.80		
Total Site Fencing									$112,809
Air Monitoring									
-OVA	10 months	$1,632.00	1990	2	1.02	$1,664.64	$16,646.40		
-HNu meter	10 months	$1,236.00	1990	2	1.02	$1,260.72	$12,607.20		
-Oxygen/Comb. Gas Meter	10 months	$248.00	1990	2	1.02	$252.96	$2,529.60		
-RAM	10 months	$1,236.00	1990	2	1.02	$1,260.72	$12,607.20		
-FAM	10 months	$1,236.00	1990	2	1.02	$1,260.72	$12,607.20		
Total Air Monitoring Costs									$56,998
Equipment Decontamination									
-Rental of steam cleaner	10 months	$390.00	1990	1	1.02	$397.80	$3,978.00		
-Decontamination pad	1 item	$500.00	1991	3	1.00	$500.00	$500.00		
-Wastewater disposal	100 drums	$135.00	1990	1	1.02	$137.70	$13,770.00		
Total Equipment Decon Costs									$18,248
Engineering Mgmt. Mob/Demob (1 trailer)	10 months	$400.00	1990	1	1.02	$408.00	$4,080.00		
Runon/Runoff Controls									
-Diversion Berm (1492 yd.x 1.0 yd.x 1.3 yd.)	1940 cu.yd.	$3.41	1990	1	1.02	$3.48	$6,747.71		
Total Runon/Runoff Controls									$6,748

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
Stabilization/Solidification									
-Treatability Study	1 time	$20,000.00	1991	3	1.00	$20,000.00	$20,000.00		
-Mob./Demob.	37,530 cu. yd.	$1.80	1990	8	1.02	$1.84	$68,905.08		
-Equipment Rental	37,530 cu. yd.	$26.23	1990	8	1.02	$26.75	$1,004,100.14		
-Consumables	37,530 cu. yd.	$8.12	1990	8	1.02	$8.28	$310,838.47		
-Labor	37,530 cu. yd.	$16.56	1990	8	1.02	$16.89	$633,926.74		
-Supplies/Raw Materials	37,530 cu. yd.	$26.45	1990	8	1.02	$26.98	$1,012,521.87		
-Utilities	37,530 cu. yd.	$0.98	1990	8	1.02	$1.00	$37,514.99		
-Health and Safety (29%)				6			$889,664.11		
Total Stabilization/Solidification Costs									$3,977,471
Confirmation Sampling									
-Borings (10 at 10 ft.)	100 ln. ft.	$37.00	1990	1	1.02	$37.74	$3,774.00		
-Asbestos Analysis	20 samples	$200.00	1991	3	1.00	$200.00	$4,000.00		
-Sampling Equipment	1 item	$500.00	1991	3	1.00	$500.00	$500.00		
Total Confirmation Sampling Costs									$8,274
Site Restoration									
-Mob./Demob.	1 time	$240.00	1990	1	1.02	$244.80	$244.80		
-Fill (Buy, Load and Haul)	7,500 cu.yd.	$7.55	1990	1	1.02	$7.70	$57,757.50		
-Backfill	7,500 cu.yd.	$1.01	1990	1	1.02	$1.03	$7,726.50		
-Grading	50,820 sq.yd.	$0.52	1990	1	1.02	$0.53	$26,954.93		
-Seeding/Revegetation	10.5 acres	$1,200.00	1985	4	1.14	$1,368.00	$14,364.00		
Total Site Restoration Costs									$107,048

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
Groundwater Wells									
-Mob./Demob.	2 item	$500.00	1990	1	1.02	$510.00	$1,020.00		
-Drill Rig and Crew	3 days	$1,200.00	1990	1	1.02	$1,224.00	$3,672.00		
-Drilling (8 wells, 20 ft.)	160 ln. ft.	$20.00	1990	1	1.02	$20.40	$3,264.00		
-PVC piping	160 ln. ft.	$2.52	1990	1	1.02	$2.57	$411.26		
-Risers	8 items	$125.00	1990	3	1.02	$127.50	$1,020.00		
-Screens	8 items	$125.00	1990	3	1.02	$127.50	$1,020.00		
-Grout	16 bags	$35.00	1990	3	1.02	$35.70	$571.20		
-Bentonite	2 bags	$25.00	1990	3	1.02	$25.50	$51.00		
-Lock Box	8 items	$150.00	1990	3	1.02	$153.00	$1,224.00		
Total Groundwater Well Installation Costs									$12,253
Direct Capital Cost Subtotal									$4,303,929
CAPITAL COSTS - INDIRECT									
Engineering and Design(6%)				5					$258,236
Legal and Administrative(3%)				5					$129,118
TOTAL CAPITAL COSTS									$4,691,283
OPERATION AND MAINTENANCE COSTS									
-Groundwater Sampling									
Sampling Labor	16 hours	$50.00	1990	3	1.02	$51.00	$816.00	5	$3,101
Asbestos analyses	32 sample	$200.00	1990	3	1.02	$204.00	$6,528.00	5	$24,806
Reporting (Quarterly)	4 each	$1,000.00	1990	3	1.02	$1,020.00	$4,080.00	5	$15,504
TOTAL NET PRESENT VALUE OF O & M									$43,411
SUBTOTAL									$4,734,694
CONTINGENCY(20%)									$946,939
TOTAL PRESENT VALUE COST FOR ALTERNATIVE 4									$5,681,633

White Bridge Road/New Vernon Road Properties - Alternative 5:
ACM Excavation with Off-Site Landfill Disposal

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
CAPITAL COSTS - DIRECT									
Site Fencing									
-Chain-link Fence	8145 ln. ft.	$13.50	1990	1	1.02	$13.77	$112,156.65		
-Warning signs	20 items	$32.00	1990	1	1.02	$32.64	$652.80		
Total Site Fencing Costs									$112,809
Air Monitoring									
-OVA	9.5 months	$1,632.00	1990	2	1.02	$1,664.64	$15,814.08		
-HNu meter	9.5 months	$1,236.00	1990	2	1.02	$1,260.72	$11,976.84		
-Oxygen/Comb. Gas Meter	9.5 months	$248.00	1990	2	1.02	$252.96	$2,403.12		
-RAM	9.5 months	$1,236.00	1990	2	1.02	$1,260.72	$11,9[illegible].84		
-FAM	9.5 months	$1,236.00	1990	2	1.02	$1,260.72	$11,976.84		
Total Air Monitoring Costs									$54,148
Equipment Decontamination									
-Rental of steam cleaner	9.5 months	$390.00	1990	1	1.02	$397.80	$3,779.10		
-Decontamination pad	1 item	$500.00	1991	3	1.00	$500.00	$500.00		
-Wastewater disposal	100 drums	$135.00	1990	1	1.02	$137.70	$13,770.00		
Total Equipment Decon Costs									$18,049
Engineering Mgmt. Mob/Demob									
(1 trailer)	9.5 months	$400.00	1990	1	1.02	$408.00	$3,876.00		
Runon/Runoff Controls									
-Diversion Berm (1492 yd.x 1.0 yd.x 1.3 yd.)	1940 cu.yd.	$3.41	1990	1	1.02	$3.48	$6,747.71		
Total Runon/Runoff Controls									$6,748

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
Collection Trench									
-Excavation (1800 ln. ft.)	17,000 cu.yd.	$3.55	1990	1	1.02	$3.62	$61,557.00		
-Gravel (Buy, load, and fill)	17,000 cu.yd.	$8.15	1990	1	1.02	$8.31	$141,321.00		
-Haul	17,000 cu.yd.	$2.99	1990	1	1.02	$3.05	$51,846.60		
-Collection/Discharge Equipment	205 days	$445.00	1990	1	1.02	$453.90	$93,049.50		
Total Collection Trench Construction Costs									$347,774
ACM Excavation									
-Mobil./Demobil.	1 time	$880.00	1990	1	1.02	$897.60	$897.60		
-Surveying	1 day	$960.00	1990	1	1.02	$979.20	$979.20		
-Excavation/Transportation	37,530 cu.yd.	$60.00	1988	10	1.06	$63.60	$2,386,908.00		
-Health and Safety(237%)				6			$5,656,971.96		
-Off-site Landfill Disposal	37,530 cu.yd.	$80.00	1991	10	1.00	$80.00	$3,002,400.00		
Containment Structure									
-lease cost	37,655 sq. ft.	$5.50	1991	11	1.00	$5.50	$207,102.50		
-construction and removal	2 times	$19,880.00	1990	11	1.02	$20,277.60	$40,555.20		
-shipping	2 times	$6,000.00	1991	11	1.00	$6,000.00	$12,000.00		
-moving costs									
-crane rental and crew	108 days	$634.00	1990	11	1.02	$646.68	$69,841.44		
-labor	1040 hours	$26.05	1990	11	1.02	$26.57	$27,633.84		
-exhaust air emissions control	3 units	$2,475.00	1990	11	1.02	$2,524.50	$7,573.50		
Total Excavation Costs									$11,412,863
Confirmation Sampling									
-Sampling Labor	8 hours	$50.00	1991	3	1.00	$50.00	$400.00		
-Asbestos Analysis	140 samples	$200.00	1991	3	1.00	$200.00	$28,000.00		
-Sampling Equipment	1 item	$500.00	1991	3	1.00	$500.00	$500.00		
Total Confirmation Sampling Costs									$28,900

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
Site Restoration									
-Mob./Demob.	1 time	$240.00	1990	1	1.02	$244.80	$244.80		
-Fill (Buy, Load and Spread)	20,530 cu.yd.	$7.55	1990	1	1.02	$7.70	$158,101.53		
-Grading	50,820 sq.yd.	$0.52	1990	1	1.02	$0.53	$26,954.93		
-Seeding/Revegetation	10.5 acres	$1,200.00	1985	4	1.14	$1,368.00	$14,364.00		
Total Site Restoration Costs									$199,665
Groundwater Wells									
-Mob./Demob.	2 item	$500.00	1990	1	1.02	$510.00	$1,020.00		
-Drill Rig and Crew	3 days	$1,200.00	1990	1	1.02	$1,224.00	$3,672.00		
-Drilling (8 wells, 20 ft.)	160 ln. ft.	$20.00	1990	1	1.02	$20.40	$3,264.00		
-PVC piping	160 ln. ft.	$2.52	1990	1	1.02	$2.57	$411.26		
-Risers	8 items	$125.00	1990	3	1.02	$127.50	$1,020.00		
-Screens	8 items	$125.00	1990	3	1.02	$127.50	$1,020.00		
-Grout	16 bags	$35.00	1990	3	1.02	$35.70	$571.20		
-Bentonite	2 bags	$25.00	1990	3	1.02	$25.50	$51.00		
-Lock Box	8 items	$150.00	1990	3	1.02	$153.00	$1,224.00		
Total Groundwater Well Installation Costs									$12,253
Direct Capital Cost Subtotal									$12,197,086

CAPITAL COSTS - INDIRECT

Item	Quantity Units	Unit Price	Basis year	Reference	Adjustment Factor	1991 Unit costs	1991 Costs	Years (O&M)	Present Value(O&M)
Engineering and Design(6%)				5					$731,825
Legal and Administrative(3%)				5					$365,913
TOTAL CAPITAL COSTS									$13,294,824

COST REFERENCES

1. R.S. Means Company, Inc., Building Construction Cost Data, 48th Edition, 1990.

2. EPA Technologies Corporation, Equipment Rental Costs, 1990.

3. EPA Cost Estimate, March 1991.

4. U.S. EPA, Remedial Action at Waste Disposal Sites, October 1985. EPA/625/6-85/006.

5. JRB Associates, Remedial Action Costing Procedure Manual, October 1987. EPA/600/8-87/049.

6. Environmental Law Institute, Compendium of Costs of Remedial Technologies at Hazardous Waste Sites, October 1987. EPA/600/2-87/087.

7. Vitrifix of North America, Inc., March 1991.

8. U.S. EPA, Applications Analysis Report, International Waste Technologies/Geo-Con In-Situ Stabilization/Solidification, August 1990. EPA/540/A5-89/004.

9. McGraw-Hill Publishing Company, Engineering News Record, February 18, 1991.

10. Grand Central Sanitary Landfill Inc. 1991. Personal Communication, Mr. James Doherty of Alliance Technologies with Dave Docking on April 4, 1991.

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